

# *Rocks and Minerals*

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Official Journal of the Rocks and Minerals Association

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A Magazine for Mineralogists, Geologists and Collectors

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*July, 1947*

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## CHIPS FROM THE QUARRY

### 17,000 ACRES AT TUXEDO FOR SALE IN ONE PARCEL

Sterling Park, comprising 17,000 acres between Tuxedo Park and Greenwood Lake, Orange County, N. Y., has been placed with the Alexander Summer Co., of Teaneck, N. J., for liquidation in one unit. The property figures conspicuously in Revolutionary annals. Its iron mines and smelting plant provided metal with which Colonial soldiers made arms, chains and other defensive material.

Mr. Summer said that the 17,000-acre park was adaptable to any use to which property can be put. "It lends itself readily for use as a strategically located site for research laboratories; vacation spot for co-workers in large industrial companies, as well as municipal or state government employees; a summer vacation development; all-year residential community; college or seminary; amusement park or lake resort and private estates," he observed. "Because of its vast extent and diversified contour, the property is also suitable for a country club, sports club or kindred organization. It offers every facility for land or aquatic activities."

*New York Herald-Tribune, May 25, 1947*

The above property includes many old magnetite mines among which are the Augusta, Bering, Brennan, California (Upper and Lower), Crawford, Cook, Crossway (or Causeway), Fletcher, Hard, Lake, Long, Middle, Mountain, Parterson, Red-back, Smith, Steele, Sterling, Summit, Tiptop, and Whitehead.

In 1920 the Editor of *Rocks and Minerals* was the mining engineer at these mines which were then operated by the Ramapo Ore Co., of Sterlington, N. Y. Only one mine at that time was in operation, the Lake Mine; the Scott Mine was being developed while the Cook Mine was being prospected.

The Lake Mine, which is completely under Sterling Lake, is the largest of

them all; the adjacent Sterling Mine has been so completely obliterated on the surface that it could never be located definitely, even with diamond drilling.

There is a huge dump at the Lake Mine (part of which is no doubt due to the Sterling Mine) on which fine specimens of magnetite, hornblende, oligoclase, augite, epidote, and other minerals may be found.

(We are indebted to Raymond Conover, of Stone Ridge, N. Y., for the item clipped from the New York newspaper).

### International Mining Days Celebration To Be Held in El Paso, Texas October 27-29, 1947

E. McL. Tittmann, general manager of the El Paso Smelting Works, has been appointed chairman of the El Paso Mining Committee. This committee will sponsor the 1947 International Mining Days celebration and make arrangements for the American Mining Congress, Western Division, convention, which opens Oct. 27 and continues through Oct. 29, with registration on Oct. 26.

Immediately following his appointment, Mr. Tittmann began to organize his committee, with the mining industry in the El Paso area fully represented. At the same time Mr. Tittmann announced that several mining men of New Mexico would be asked to serve. Committee appointments were announced May 1, and the committee held its first meeting on May 14. Arrangements for the American Mining Congress convention and entertainment plans for International Mining Days, which will be host to the convention, was outlined at this meeting.

Meanwhile, J. J. Shores, secretary of the Mining Committee, reports that requests for hotel reservations continue to come in every day. A stockpile of 650 hotel rooms has been blocked off for the convention, and the committee will make hotel designations sometime in July.

The National Program Committee of the American Mining Congress will meet in El Paso late in June. H. M. Lavender, of Douglas Ariz., Vice President and General Manager of the Phelps-Dodge Corporation, is chairman of the Western Division.



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## THE AGNI MANI—MAGIC GEM OF THE ORIENT

Far Eastern Traditions and Beliefs About a Rare Tektite.

BY BARON RICHARD JOHAN DE TOUCHÉ-SKADDING

Through centuries, many legends and tales have referred to magic stones, but most of these have vanished into the limbo of the forgotten past. While in the West newly discovered minerals like radium and uranium almost approach the definition of magic stones, in the Orient old traditions have preserved the beliefs in the efficacy of some rare stones.

In a class by itself is the Agni Mani, the Sanskrit name for "Fire gem," according to ancient chronicles it is known to have been highly esteemed some 2500 years ago. It originated in the East Indies and is mentioned in travel records of Chinese Buddhists who visited India by way of Indonesia in the 5th century. This gem was said to be extremely rare and only kings and emperors owned it then. Its existence was first reported in Java, which was colonised by South Indian emigrants in the 2nd century A.D., who established mighty colonial empires under the Indian Pallava dynasty.

Leading European historians have translated and studied Chinese and Arab chronicles which are informative about life in Indonesia during the early centuries of our Christian era. References to the Agni Mani occur in these records which was regarded as a magic gem of great mystic power. The King of Java was said to own such a gem, to which his power and influence was ascribed. The royal dynasty itself was supposedly safeguarded by it.

The Chinese Tang annals of the 7th century described the Agni Mani as being in size and shape like a bird's egg, dark in colour, with a rough surface. Its structure was said to be crystal-like. Ancient Indian religious literature also makes

mention of it. But until recently, no definite identification had been possible.

In ancient Indonesia, India and China, gold, diamonds and other precious stones were already well-known, and it is noteworthy, that the Agni Mani was treasured as the most precious of all. The Chinese called it "Huo Chu," and the Javanese "Kumbalageni;" both names are a literal translation of "Fire pearl," defining it as a gem and suggesting its contact with fire.

### Billiton Island source of origin of Agni Mani

Based upon data in ancient records, the island of Billiton has been identified as the source of origin of the Agni Mani. In Java magic and healing properties were ascribed to this gem. It has been recorded that for years rival kings strove for the possession of the "Danau Raja," a large Agni Mani (weighing about 36 carats). The Chinese Tang Annals mention that King Kalanvinka of Java sent his emissary to the Emperor of China in the year 523 A.D., bearing one rare, precious Agni Mani as annual tribute for that year. These references to the Agni Mani



Agni Manis. In condition as discovered on site on Billiton Island.

indicate that its popularity as a magic gem must have originated in great antiquity, at least 500 years before the Christian era.

By a coincidence of circumstances, these old traditions have now been linked with a rare mineral of celestial origin, recently discovered in Indonesia. Within the triangle formed by Singapore, Java and Borneo, lies the island of Billiton, where some of the richest tin mines in the world are located. Early in 1939, the curator of Raffles Museum, Singapore, mentioned to me a find of meteorites on that island, and upon his suggestion, I visited Billiton. There I was fortunate to obtain a few small black stones with sculptured surfaces, suggestive of moon craters and lined with deep grooves. The stones ranged from a quarter to one and a half inches in diameter. Some were round in shape and others oval. Javanese and Chinese mining hands were superstitious about these stones and believed them to be the seed from which tin grows (calling them "ibu bidji"). When on a rare occasion such a stone is found, they immediately bury it again in order not to despoil the riches of the soil; many tin miners shared the belief that these stones possessed great supernatural powers, and Javanese believed that these stones were black diamonds.

From what I could gather, this stone was in some way associated with old beliefs, but I was unable to connect it, at the time, with any known tradition. The Raffles Museum, Singapore, were glad to have two specimens, and the rest remained in my collection. Subsequently, I learned that elsewhere in Indonesia, certain Javanese, Chinese and Malays knew of such meteoric stones and ascribed supernatural powers to them. But as these stones are rarer than diamonds, only very isolated instances of ownership are known.

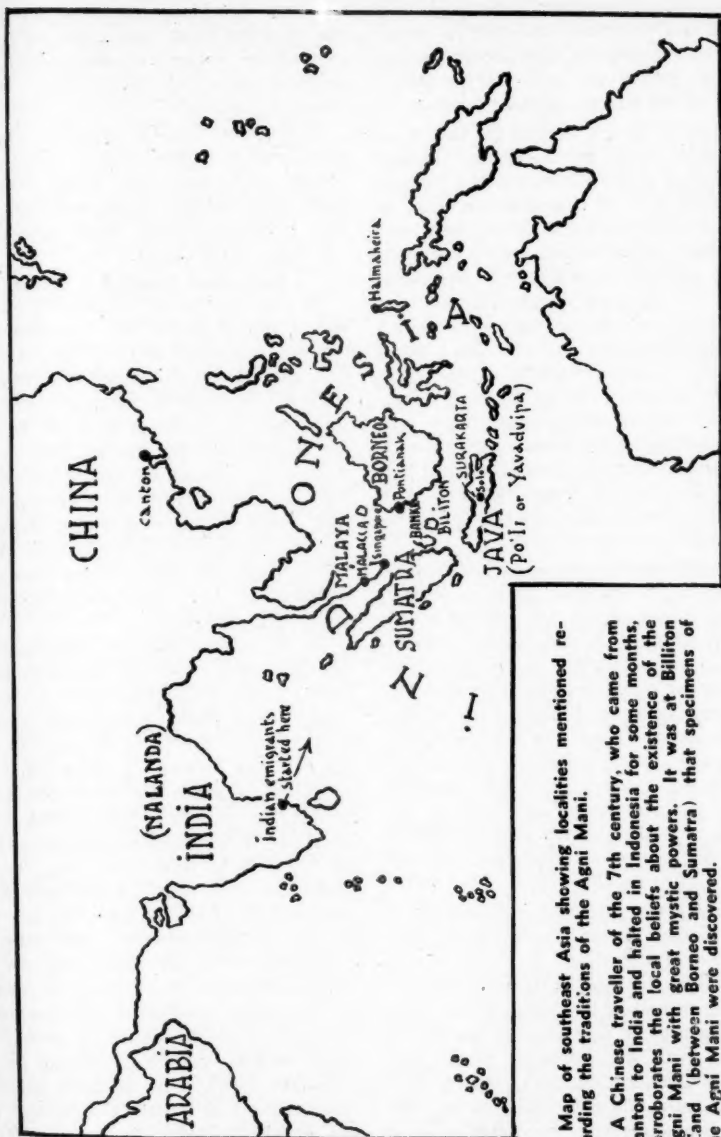
I became increasingly interested in this meteorite and took time during journeys across Java, Borneo and through Malaya, to investigate existing records of ownership.

#### **Agni Mani's Mystic Powers**

In one instance, during a visit to His Highness the Sultan of Pontianak, in Western Borneo, I learned that he possessed such a meteoric gem, which he sometimes placed in the basket containing his favourite fighting cock, and it was said that his bird would invariably win. The gem, which he had inherited from his ancestors, was also held to be responsible for the preservation of the royal lineage. This could hardly be doubted, judging from the large flocks of children with



The seashore on Billiton Island where the Agni Mani occurs.



Map of southeast Asia showing localities mentioned regarding the traditions of the Agni Mani.

A Chinese traveller of the 7th century, who came from Canton to India and halted in Indonesia for some months, corroborates the local beliefs about the existence of the Agni Mani with great mystic powers. It was at Billiton Island (between Borneo and Sumatra) that specimens of the Agni Mani were discovered.

which His Highness's palace abounded. In any case, the gem was safely kept under lock and key in a modern safe. Then there was the time, when the Sultan

wished to influence the Dutch Colonial Government to appoint his favourite Son as his successor, but Government opposition to this plan was known to be very

strong. Some time later, I heard that the Sultan had prevailed, and that his chosen heir was eventually appointed—because he had carried the gem on his person when on his mission to the Governor.

While in Java, I visited the independent native state of Surakarta. During an evening at the ruler's court, I brought up the subject of the meteoric gem of Billiton, and was rewarded not only with interesting information, but a specimen of the gem was shown to me. The Susuhunan of Surakarta, titular Emperor of Java, owns such a black meteorite, which he inherited from his ancestor; King Erlanga, a Javanese ruler in the 11th century, to which he attributes his long life and robust constitution. This gem is said to endow the owner with physical and mental strength. It was believed that for as long as the stone remained with the ruling house, that the state of Surakarta would continue to exist.

On another occasion, when I visited the tin mining district of Ipoh in British Malaya, I came upon the case of a very wealthy Chinese tin mine owner, who ascribed his good fortune to the possession of a similar meteoric gem. This man had previously been an illiterate labourer and rose to become one of the wealthiest and, subsequently, most influential persons. He also owned a racing stable and confided in me that he occasionally placed the gem in a leather satchel and attached it to the left ear of his racehorse. According to him, it usually won.

While I was directing excavations in Malacca town, I met an old Malay sage, who told me this tale: It was said that Mahmud Shah, the last Malay Sultan of Malacca, owned a black magic stone. One day a Portuguese fleet came to anchor off Malacca with the intention of trading. Mir Abdullah, the Sultan's adviser, stole the precious talisman and blamed the theft upon some Arab merchants, who in turn were accused of having sold it to the Portuguese. The Sultan, apprehensive of the consequences, imprisoned the Europeans. The stone was not recovered, but, instead, a second Portuguese fleet came to the aid of the prisoners and conquered

Malacca. My Malay informant added that the invaders must have obtained possession of the Sultan's talisman, which thus enabled them to seize and conquer Malacca.

With reference to this tale, History does record similar events, which happened in the year 1510, when Don Alfonso Albuquerque commanded the second Portuguese fleet which vanquished the Sultan of Malacca.

#### **Agni Mani classified a tektite**

In the summer of 1939 I left Malaya and arrived in India, but the outbreak of the war prevented me for some years to give attention to the meteoric gems from Billiton. In 1944 I sent one portion of a specimen to Professor Sir C. V. Raman, the director of the Indian Institute of Science at Bangalore, for examination. This eminent scientist made several tests and classified the mineral as a tektite. The following are brief extracts from the Proceedings of the Indian Academy of Sciences," Vol. XX, July 1944, relating to this mineral:

"In an article regarding the examination of a tektite, Mr. A. Sigamony (Department of Physics, Indian Institute of Science, Bangalore) writes about a communication by Sir C. V. Raman, Kt., F.R.S.N.L. as follows: . . . as a result of his investigations of the ancient literature, notably the records of the seventh century A.D., Baron de Touché-Skadding has identified these stones with the "magic stones" or "fire pearl" which were esteemed highly by the ancients and believed to have mystic powers. . . the material was found to be extremely hard and it has been reported that during the cutting and polishing process of one specimen, the surface of the polishing steel disc was so severely cut, that it became pitted with deep holes. The specimen sent for examination had a part of its surface cut and polished plane, while the rest of it had the original ovoid form of the stone, and was marked with deep grooves. Among other experiments conducted in the laboratories, the magnetic susceptibility of the stone was measured by a Curie balance, and it was found to be 7.78 x

10.6 per gm. at 250 C. The specific gravity was found to be 2.448. Dr. R. S. Krishnan studied the stone by X-ray methods and found it to be of an amorphous structure. From the Brewsterian angle for the reflection at the polished surface, its refractive index was estimated at 1.535. The analysis showed that it consists of 70.92% silica, 1.04% ferric and 5.42% ferrous oxides." The article concludes with the author's wish to record his deep sense of gratitude to Professor Sir C. V. Raman for his keen interest and encouragement in this work.

While tektites are a new subject of study to Oriental mineralogists, they have been known to Western scientists for some time. They were at first believed to be obsidians, but the absence of volcanic rock on Billiton rules out this possibility. R. D. M. Verbeek was the first to propose that they might be of extraterrestrial origin. These very rare minerals are a kind of natural glass, consisting mostly of silica and usually also containing a small quantity of free alumina. They differ from terrestrial volcanic glass (obsidians) by the proportions of iron, lime and magnesia, which they contain. Physically they are distinguished by the complete absence of crystallisation. The tektites of Billiton are unique because of their strongly etched surface. Tektites occur only in fragments of definite shape, which is usually spherical or oval. They are found in very few regions on earth and bear no relationship to the substratum on which they are found, but compare closely to sedimentary rock. Tektites have now been universally accepted as being of meteoric origin.

Later, by comparing notes with fellow members of the Royal Asiatic Society, interested in scientific research, it became increasingly evident that *the Agni Mani of the ancients is identical with the black meteorite from Billiton*. It is equally certain, that in instances where I have traced present ownership of these meteorites, the stones are also identical with the Agni Mani. A chain of uninterrupted traditions extending over twenty-five centuries has thus been established.

### **Agni Mani well known to ancient people of India**

After reading a paper about the "Discovery of the Agni Mani" at the Royal Asiatic Society in Bombay, the interest in this gem began to spread in India. The press and private publications discussed the relationship of the Agni with India. Professor R. G. Gyani, Curator of the Prince of Wales Museum, Bombay, revealed to me, on one occasion, that he had discovered a similarity between the Agni Mani and the legendary "Saimantakmani" jewel, which is associated with Lord Krishna, a mythological Hindu deity. The Professor, who had made a special study of Hindu scriptures pointed out, that there was close association of beliefs between the Chinese, Indonesians and the Indians. As a leading member of the Astrological Society of India, he was of the opinion, that the Agni Mani was one of the ancient celestial jewels, associated with the Zodiac.

He asserted that the Agni Mani was known to the ancient people of India, which they connected with astronomical and mineralogical phenomena. The ancient Rishis (high priests) of India, who led a simple and highly cultured life, knew a great deal of these manifestations, and by their experiments in the domain of astronomical, mineralogical and medicinal practices, and by co-ordinating their results, arrived at certain conclusions, which to a layman would sound like magic. Their faithful followers accepted these conclusions which have been handed down through generations. He further expressed the belief that this rare meteorite still possesses certain auspicious and efficacious qualities.

Then I had received a letter from Dr. Leonard J. Spencer, formerly Keeper of Minerals at the British Museum, expressing interest in the traditions, associated with the Agni Mani, and asking for further information on the subject. He later wrote an article about it for the Mineralogical Abstracts in the Mineralogical Magazine of Britain.

About that time, the Japanese were preparing for the invasion of India, and Al-

lied forces were very limited and inadequately equipped. Admiral Lord Louis Mountbatten was the Supreme Commander of the Southeast Asia allied front, including Burma. Possibly, in anticipation of the expected enemy invasion of India, his headquarters moved from Delhi to Ceylon. On the 28th February, 1944, I sent the Admiral one half of an Agni Mani, with a reprint of the paper read at the Royal Asiatic Society. Two days later, I received his reply, confirming receipt of the gem and expressing "the hope that there was something in the special qualities which are attributed to it."

The press reported that on the 5th of March, according to Lord Louis Mountbatten's personal idea, allied commandos in gliders, towed by aircraft, were landed in the Burmese jungle behind the Japanese lines. A complete surprise had been effected and the enemy's plans were upset. This offensive, subsequently, proved decisive against the Japanese, who never again recovered the initiative in Southeast Asia.

#### **Author's trip to the Himalayas**

When the situation in India made it safe to travel, I made a journey to the Kulu Valley in the Himalayas. Travel from the plains into the precincts of the "roof of the world" (as the Himalayas are called) did not lack adventure; narrow roads wound above steep precipices and the cool mountain air and the people appeared different from those of the plains. Pale skinned mountaineers tended flocks of sheep and goat. After a week's travel, I reached the Kulu Valley which is surrounded by snowpeaks rising above 20,000 feet. I had come to this Shangri-la of fruit orchards, pinewoods and glaciers with the intention of spending a few peaceful months.

During my sojourn in this valley, I received an invitation from Professor Nicholas Roerich, a savant and painter of world repute. This philosopher and sage is also an authority on Tibet and Mongolia, which he explored on several occasions. After a tortuous ride on a mountain pony, which scrambled with the agility of a goat over rocks, along narrow



**Half of above Agni Mani presented by the author to Admiral Lord Louis Mountbatten.**

ledges and up steep paths, where a slip would have meant eternity, I arrived at the Roerich residence, set amid a forest of tall Himalayan deodar pines. The charming, oldworld courtesy of my host made me feel welcome. The interior of his home was richly decked with carpets, Tibetan banners and gilded Buddhas. During a very lavish lunch, served by liveried servants, the professor noticed my ring, into which one half of a polished Agni Mani is set. He confessed to a feeling of attraction to the gem. While I told him what is known about the Agni Mani, he listened with growing interest. Later, he brought out the diary of his Tibetan journeys and read his notes on the Stone of Shambala, the most sacred jewel of Tibet, kept by the Tashi Lama at Naran Obo. The Tibetans hold that this gem originates from the constellation of Orion.

Professor Roerich believes that there is a strong affinity between the Agni Mani and the sacred Stone of Shambala, and that it is also identical with the stone of the Holy Grail. He also related many unusual experiences in Tibet, having witnessed instances of telepathy, transfiguration and other supernatural phenomena, for which science has as yet no explanation.

#### **Agni Mani becomes author's credential**

What I heard from Professor Roerich, urged me to explore the upper plateau of Lahoul, which lies in the north toward



Tibet. The weather favoured the progress of our expedition, and I visited several Buddhist monasteries. On occasions the monks recognised the gem I was wearing, and begged permission to worship it, by placing it upon their heads. The Agni Mani became a credential, which opened all gates and made our expedition welcome everywhere. The Tibetans loaded us with gifts of hand-woven scarves, copper, silver and gold ornamented teapots and wine jars, gilded and jewelled Buddhas and delicately worked silver. The Head Lama of a monastery told me on one occasion, that the Agni Mani, which I wear, was a free pass everywhere in Tibet, and would ensure a welcome at any time. Despite my attempts to repay their hospitality, they would invariably request the modest favour of being allowed to worship the "Stone of Shambala," as they called it.

After a short time on the upper Himalayan plateau, I returned to the Kulu Valley and eventually to Bombay, where I again met Professor Gyani, with whom I discussed the substance of Tibetan beliefs and the identity of the Agni Mani with the sacred Stone of Shambala. Shortly after that, I was invited to the palace of an Indian Maharajah, who told me, that his family belonged to a Rajput clan, descended in a direct line from Lord Krishna, who, although defied, had in reality been an Indian Prince. His Highness was in difficulties, and wanted to obtain an Agni Mani, which, he believed, would benefit him.

He now wears a small piece mounted in gold, on a string of pearls around his neck. His expectations were soon justified and his turn of good fortune became known in India. It was not long, before I was approached by other ruling princes, who invited me to their states and expressed their eagerness to possess a fraction of an Agni Mani. As events showed, in every instance the owner experienced a favourable change. The ancient legend of the Agni Mani has, therefore, been revived by a chain of coincidences which defy explanation.

These excerpts from ancient chronicles, legends and coincidences, truly confer

upon the Agni Mani the title "most mystic gem of the Orient."

#### References

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#### Selenite Occurrence in Angola

Near Benguela, a seaport in western Angola, large crystal masses of selenite may be found. One cleavage mass in the collection of the Editor of *Rocks and Minerals* is  $3\frac{1}{2} \times 3\frac{1}{2}$  inches in size, is colorless, and under the Mineralogist fluoresces a nice yellow color. Unfortunately nothing is known about the occurrence as the specimen was collected as a curiosity in 1932 by a traveller who knew nothing about minerals. He took the specimen to Lourenco Marques, in Mozambique, where it was given to a friend, a mineral collector, (Mr. Hugh A. Ford,) who in turn sold it to the Editor in May, 1947. The traveller has since died. Mr. Ford was stationed in Lourenco Marques for many months but is now a noted mineral dealer in New York City.

Angola, a large Portuguese possession in southwestern Africa, is sometimes known as Portuguese West Africa.



## TWENTY GOOD MINERAL LOCATIONS IN A FORTY-MILE RADIUS

AREA AROUND EXTINCT VOLCANOS IS A HAPPY HUNTING GROUND FOR CALIFORNIA ROCKHOUNDS.

BY T. ORCHARD LISLE

Collectors of three types of minerals, crystals, stones for cutting and polishing, and fluorescents, will find one or two weeks holiday well occupied and profitable in an area enclosed in a circle approximately 80 miles in diameter if he takes Mount St. Helena, California, as a focal point. Within this area, which is formed by sections of Lake, Napa and Colusa counties, there is a wealth of mineral materials to be found with comparative ease at more than 20 different mining locations. I write from experience by reason of having visited many of the mines there in 1941 to 1944, and can recommend anyone visiting California this summer to spend at least a week in this district. Not only will they have an enjoyable vacation in magnificent mountain, valley, lake and river scenery in a resort area served by numerous hotels and cabins, but they should be able to obtain enough attractive minerals to keep them busy sorting and studying all next winter.

For the most part these locations are in the Mayacamas mountain range in a region of Franciscan and igneous rocks which form part of one of the most famed metallogenetic provinces in the world. It is a region of intense eruptive action of the past and many old volcanos can be recognized, not to overlook Mount St. Helena itself which blew its top a million years ago and lost its position as the highest peak on the North Continent of America, humbling itself to a lowly 5,000 odd feet from an excess of 25,000 ft.

There also are active geysers, hot springs and sulphur mud baths, and in one place mineralization is said to be actually going on today, although Donald L. Everhard of the U. S. Department of the Interior, expressed the view—following a recent geological survey—that no cinnabar is being deposited by the thermal springs at the present time. Nevertheless banded aragonite does form on

the old wooden mine shaft timbers at Clear Lake. Also, cinnabar is found in old soft wood of trees buried under 100 ft. of soil, and which have not been there long enough to be petrified like the giant trees 30 miles away.

An ideal central location for a rock hunting vacation is the little town of Calistoga, Napa County, at the foot of Mount St. Helena, and less than 100 miles north of San Francisco. It is reached by paved road. Being a resort famous for its geysers, hot mud baths and mineral waters, "old timers" after a hard day hammering and stooping can spend the evening in the baths relaxing and eliminating the aches and pains of rheumatism and lumbago, and getting fit for the next day's hunt. There is plenty of local accommodation if reservation is made well in advance. Or half-a-dozen miles south is a larger town, namely St. Helena, noted for its wineries. You are invited by big signs to visit the wine making plants. If you accept, you had better carry a large sponge to absorb the quantities of wine generously forced upon you, unless you have a good capacity. Anyhow, don't expect to do much rock hunting that day.

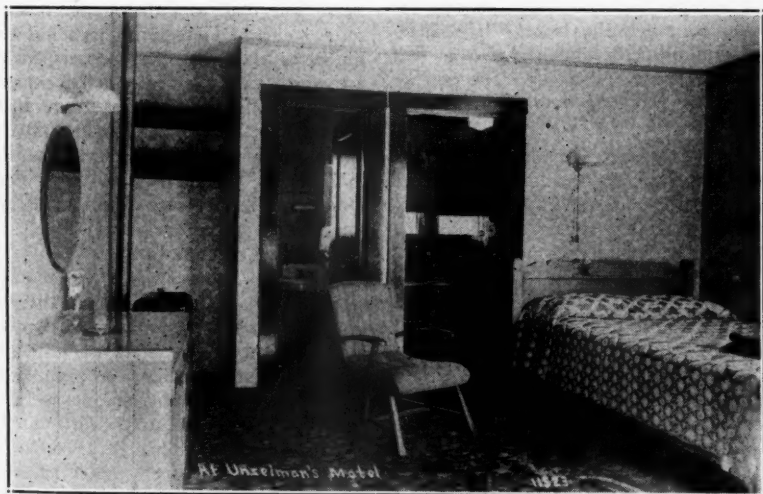
If you like water and wish to mix a little good fishing with your rock collecting, you can make Clear Lake your central point of operation. There are many cabins and hotels along the lake front. One huge resort hotel at Lucerne was closed during the war; but I found some very charming and modern cabins at Four Oaks, about two miles along the east shore road. North of the lake is the village of Upper Lake, and on the west shore is the town of Lakeport, nestling under the shadow of Mount Knociti, another extinct volcano. Wherever you stay there are minerals within a few miles auto ride.

From San Francisco, the most scenic route is No.101 over the Golden Gate Bridge to Santa Rosa, which is a very attractive California town. Then follow the main highway north for nine or ten miles and turn right on the paved road to Calistoga at the direction sign. As you near Calistoga you will pass the famous petrified forest which is well worth seeing. It is about five miles from Calistoga, before driving down the steep hill into the town. At Cotati, before reaching Santa Rosa, you can call at Jack London's old home. There is a large and active quarry at the bend of the road before entering Cotati, and you are likely to miss it unless you turn your car around when you reach the town and drive back half a mile. Cotati, by the way, is noted for its eggs and poultry, but I never found any petrified eggs. While I have passed the quarry many times, I always was too eager to be going elsewhere to stop and see if it has any minerals.

#### GUERNEVILLE QUICKSILVER MINE

Should you fall for the beautiful flowers and decide to stay one night at Santa Rosa, one of the motels I can recom-

mend is Unselman's, a mile south of the town. When my wife and I stayed there the modern cabins were smothered with the glorious roses. The grounds are well landscaped and garages are attached to each cabin. It is but a comparatively short trip to the Guerneville quicksilver mine from Santa Rosa. The town of Guerneville is in the Russian river district of Sonoma County. In the wooded hills four miles away is the mine, which formerly was known as the Great Eastern and Mount Jackson mines, and is now one intergrated working. After I visited the mine I heard that there is a ledge of highly opalized rock contacting the serpentine and sandstone. My visit was not without results, however, because the mine geologist gave me a magnificent cinnabar crystal about one-inch long, by  $\frac{3}{4}$  inch diameter. Under the power glass this red and silver crystal had many vertical faces, and looked like the columns in the Devil's Postpile in minature. Some of the rocks had tiny pockets of what looked like dried bitumen, which the superintendent said is coal in formation.



Interior view of Unselman's Motel showing how spacious and comfortable the cabins are.

### QUARRY NEAR OCCIDENTAL

Ten miles South of Guerneville, near Occidental, there is a shrub covered, old quarry containing a light green stone impregnated with small red garnets lying around in boulder form. This quarry cannot be seen from the road, so you will need local directions. There is another quarry which can be seen from the road, but although I spent about an hour there I did not see any traces of mineral bearing rock; but this does not mean that there is none there.

### SKAGGS SPRINGS QUICKSILVER MINE

Returning to Highway No. 101, on which we started when we left San Francisco, you can drive to Healdsburg. As you leave town turn west and proceed to Skaggs Springs, the only place in the world where Curtisite crystals are found in any quantity. The mine, shut down about half-a-dozen years ago and all the equipment removed, is located on a ranch close to the Curtis resort hotel, which was closed during the war. The Curtisite may be hard to find in the daytime, and you should ask permission and directions at the first house on the right after entering the driveway gate alongside the hotel. If Leo Curtis, after whom Curtisite was named, is around so much the better. If you respect his property and rights you will find him a pretty good guy. The rancher leasing the property lives in the house in question.

After examining many dozens of fluorescent minerals, including Wernerite and Willemite, I have very definitely decided Curtisite easily is the most brilliantly fluorescing of all minerals, especially if you are fortunate to find a rock with a coating of crystallized Curtisite at least one-eighth inch deep. The crystal resembles sulphur. Much of the Curtisite is more in the nature of a thin powdery coating on the rocks, that has filled hair cracks. Alongside the mine stope there is an open cut where Curtisite can be dug out.

Curtisite crystals, says Dr. Bela Hubbard, geologist, belong to the orthorhombic system. They are bi-pyramidal

and thin out to invisibility towards their basal edges. Under the microscope they seem to lack sharpness and to be slightly out of focus, which is a remarkable peculiarity.

### THERMAL SPRINGS NORTH OF SKAGGS SPRINGS MINE

Just north of the Skaggs Springs mine there are some thermal springs where realgar, orpiment and curtisite can be found, as well as metacinnabar. On each of the occasions that I visited Skaggs Springs I forgot to look for the thermal springs—possibly they are somewhere along the stream which flows through the property. Mr. Gary or Mr. Symonds of the California State Division of Mines, Ferry Bld., San Francisco, probably can give proper directions. In any event the fine mineral exhibit in the Ferry Building should not be missed, or the 600 ft. relief map of California, which is the most remarkable of its kind ever constructed.

### THE GEYSERS

From Skaggs Springs you drive back to Route 101, and there is a road which leads across country direct to Calistoga, namely, No. 28. Don't drive back to Healdsburg, or north to Asti, unless you want to try Italian Colony wines, or want to go to Clear Lake over the mountain pass. The road to Calistoga starts a few miles south of Geyserville. Not far from the latter place are "The Geysers," which are worth seeing unless you have already been to Yellowstone Park. There also is a small but very rich cinnabar mine. I have not been there; but it was described in "Fortune" several years ago. Frank Dewey is the operator, and should have some good specimens. Some of the ore was worth \$10 a shovelful.

Although I never have visited "The Geysers," which now is a matter of great regret, it should form a bonanza for mineral collectors. The State of California Division of Mines has just published a report by H. Vonsen on the sulphate minerals of this area following a number of visits made by him. Mr. Vonsen reports alunite, alunogen, bous-ingauitite, cupro-boussingauitite, epsomite, halotrichite, (including containing nickel), mascagnite, voltaite, ammonium sulphate

with chromium, ts-hermigite, melanterite, gypsum, sulphur, pyrite, opal, cinnabar, tremolite, actinolite, stellerite crystals, quartz, calcite, and five unidentified minerals some of which may be new and are being studied by George Switzer at Yale University. Mr. Vonsen does not mention the reaction of these minerals under the violet light, but because of the volcanic nature of the entire area, and the hot springs, some of them should have a nice fluorescence.

#### PALISADES SILVER MINE

Three miles from Calistoga, Lake County, is the Palisades Silver Mine. I made a brief visit there in 1941, but was unable to go further than the sorting tables where a chute brings down the ore from the hillside. The Army was very strict in those days over strangers entering mine property. One of the men, however, gave me a couple small pieces of ruby silver ore as a souvenir. I intended to make a return visit, but whenever in the neighborhood was always so attracted and thrilled by other locations that I never did go back there. Some of the Silver ore contains gold.

#### AETNA QUICKSILVER MINE

In Napa County, nine miles north-east of Calistoga, is the Aetna quicksilver mine. Haven't been there, but the mineralized rocks should prove very interesting, as they are composed of serpentine, Franciscan sandstone, basalt and tuff, the basalt dyke cutting the sandstone. There is cinnabar in an opaline gangue. The rocks possibly give good fluorescence. The old workings are on a ridge separating the head of Pope Creek from James Creek, about two miles SE of a mine called Oat Hill. The latter has 20 miles of underground tunneling, now considerably caved in, but there should be a large rock dump. However, the geology of Oat Hill mine does not suggest anything too good in the way of collecting. Enquire before you drive to Aetna or Oat Hill, as access is by county road in mountainous country.

In the U.S. National Museum, Washington, D. C., there are attractive crys-

tals of cinnabar in silicified serpentine from the Phoenix Mine in Pope Valley, Napa County.

#### MIRABEL QUICKSILVER MINE

To reach the Mirabel mine, to which I have referred in previous articles, take the excellent road to Clear Lake north out of Calistoga and over Mount St. Helena, which no longer makes Mount Whitney look like a modest hill, but nevertheless is "quite a hill." The road runs right through the Mirabel property on the northern slope with the Bradford shaft on the left, and the Great Eastern shaft and retorts to the right, across the creek by a small wooden bridge. First obtain permission from the office—a house in the trees on the left hand side of the road before you come to the Bradford shaft. Ask for Tom O'Connor, superintendent, if the mine is still working. The powerful hoist of the Great Eastern shaft was installed by the Joshua Hendy Iron Works, Sunnyvale, Calif., who have been building mining machinery since the days of the Forty-niners and the gold rush.

The best rock dump at Mirabel is located behind the retort building on the south side of the Great Eastern shaft. Unless some new material from the mine has been deposited during the past two years, it may be necessary to get at the underneath boulders for the best specimens. Practically all recently mined ore has been going straight to the crushers, particularly when the price of quicksilver was high enough to allow putting through both rich and low grade material through the rotating furnaces. During my various visits I took away an aggregate of several hundred pounds of the best cutting and fluorescing rocks, including four pieces of about 30 lbs each, which were so brilliant and colorful under the black light that I have never seen the like from any other location. In fact, I doubt if another such magnificent showing can be found anywhere else in the country. Single pieces of banded dolomite and serpentine show blues, reds, violets, yellows and green.

Start at the bottom of the pile and work upwards. Be sure to select any

rocks containing small pockets of orange colored oil. This liquid hydrocarbon contains another hydrocarbon in suspense, namely *Curtisite*, which is responsible for much of the very brilliant fluorescing at Mirabel, although it cannot be the cause of colors other than the vivid bluish green. After a daylight inspection, and getting one's bearings, return at night with a portable ultra-violet lamp, and you will have the time of your life. As the surface rocks are exposed to brilliant sunlight, their exteriors often fade; but a crack with the hammer will expose their fluorescing loveliness. Beware of snakes, as they are partial to sleeping on warm rocks. I only saw one rattler, but there are plenty around.

Some of the rocks on the dump contain *cinnabar* (red) in minute crystals, and *metacinnabar* (silver black). One of the miners showed me a magnificent geode lined with large blood-red crystals; but he would not sell it. I have seen nothing finer in *cinnabar*. At this point I must contradict what I have stated in previous articles. I said that I had never seen raw *Curtisite*, or in crystal form at Mirabel. Recently, I found several small platy crystals in the little oil pockets in the dolomite in my collection. The oil in the pockets should be scraped out with a penknife and collected in a small glass tubular vial. It will fluoresce anything you smear it with, and is extraordinary material.

The quality of the serpentine and the dolomite vary very considerably, and only diligent search will produce high-grade polishing rock of pretty patterns. The harder the serpentine and the more dense the crystallized dolomite the better they are, and the fluorescent qualities will last for years. The fluorescence of the serpentine varies with the number of dolomite veins running through it, and partly upon the quantity of *Curtisite* in the dolomite. Incidentally, I have some water-clear dolomite crystals which look like quartz crystals and which fluoresce blue.

The mining road on the property leading up the hillside leads to a prospect worked about 1942-3, and located about

half-a-mile above Mirabel Great Eastern shaft. The dolomite there does not fluoresce so well, but one piece that I picked up also phosphoresces. Adjacent to the men's wash house and the blacksmith's shop, at Great Eastern, there is an outcrop of banded, crystallized dolomite. I broke some off, only to find that it does not fluoresce. This may be due to years of exposure, but if one dug down half-a-dozen feet and sledge hammered some of the buried material, it probably will display many colors. The first time that I found that Mirabel rock fluoresced I had taken some samples from a large dump at the Bradford mine; but this pile has since been removed and sent to the crushers.

#### GREAT WESTERN QUICKSILVER MINE

Somewhat more than a mile past Mirabel, there is a dirt road on the left of the paved highway. This leads about two more miles to the Great Western mine, which was being worked in 1944 by the Bradley interests of San Francisco. Some collectors regard the rocks from this mine fluoresce more prettily than that from Mirabel; but from what samples I have seen I am not inclined to agree. Anyhow, I decided to investigate. Accompanied by my wife, I started to drive to the mine. After a mile the road became very steep, and my car could hardly make the grade on the loose surface, and the wheels spun, playing havoc with the tires. As we neared the top and were within half-a-mile of the mine, we met a bulldozer grading the narrow road. There was no room to pass, so we had to turn back. It took ten minutes to turn the car, inch by inch backwards and forwards, gradually edging around. On the one side was the mountain wall, and on the other a deep drop. We never tried to reach the mine again. In this general locality there are a number of other quicksilver mines, many long abandoned, but their dumps may be worth examining. They are recorded in "Quicksilver Mines of California" published by the State Division of Mines.

#### CLEAR LAKE "DIAMONDS"

Four miles past Mirabel the highway



passes through the small town of Middletown. At least one of the shops has Clear Lake "diamonds" for sale, and some other minerals. These quartz crystals are to be found in a peach orchard several miles southwest of the village of Lower Lake, which lies between Middletown and Clear Lake. The best time is after a heavy shower. The best way is to pay some local inhabitant to act as guide, or you may never find the location. It is reported that one man had worked an amethystine quartz deposit which was sold for cutting into necklaces, etc. Clear Lake diamonds are small pieces of very high-grade broken quartz. No complete crystals have been found either in matrix or loose. In one afternoon I picked up about 200 pieces. Work against the sun and they will glisten in your eyes.

#### PECTOLITE NORTH OF MIDDLETOWN

I omitted to mention that just north of Middletown, there is a large deposit of very hard pectolite in equally hard serpentine. You will see a large white outcrop among trees on the top of a small hill on a fenced-in ranch on the left hand side of the highway. There is a gate which you can climb over; but this will be trespassing, and also beware of the cattle, for bulls do not like strangers. A sledge hammer is required to break the pectolite, which is attractive polishing material. Some of it was used for a fill-in when the highway was re-built; but several years ago members of the Northern California Mineral Society took most of the loose pieces away; also I went there with a friend several months before and secured some of the choice samples.

#### KNOXVILLE AND MANHATTAN QUICKSILVER MINES

At Lower Lake a very bad road leads east to Monticello, a distance of 40 miles. Twenty-two miles along this road are the Knoxville and Manhattan mines, in Napa County, which are favorite hunting grounds of Northern California rock hounds, and you pass other mines en route. Some excellent polishing rock, as well as cinnabar associated with pyrite and marcasite in black opaline gangue, is found on the dumps.

While I have visited the Manhattan mine, I have never tested the rocks for fluorescence; but I was given some black opaline cinnabar ore from the near-by Reed mine, and this sparkled with blue fluorescing spots. The Reed mine, while only two miles from Knoxville, is in Yolo County about eight miles S.W. of Rumsey.

The best way to these mines is not from Lower Lake, but from Monticello via the town of Napa. The road is bad anyhow and there are over a dozen small fords to be crossed. Enquire before you start. Telephone the mine companies is the best plan because they use the roads continuously. If they tell you that it is passable, hesitate before going. If they say that it is in good shape, you can eliminate the hesitation.

#### SULPHUR BANK QUICKSILVER MINE

The next location out of Lower Lake is the Sulphur Bank mine on the shores of Clear Lake and with Mount Knociti in the background. Eleven miles out of Lower Lake by paved road there is a dirt road on the left leading to the mine, and it has a worn direction sign. Sulphur Bank is a huge open pit and is a famous mineral location. Operations ceased about 1944 due to rich cinnabar ore at fairly shallow depths having petered out after 126,285 flasks of 72 lbs. each of quicksilver had been extracted. Below surface mining is prevented by heat from thermal springs and gases. To drive shafts and tunnels and work the ore reserves will require elaborate ventilation and cannot be done until the metal reaches a price of \$200 a flask. It is about \$85 today. There are 265,000 tons of ore, or 34,170 flasks, left in the ground for posterity, or a more profitable market.

Sulphur Bank mine is nearly 1,200 ft. above sea level. Previous to 1870 it was a sulphur mine, and 2,000,000 lbs. were produced. Sulphur crystals are obtainable today; but what I have seen has the matrix well burned, and the yellow crystals fall off if not handled very carefully. The fluorescence is very good, a pretty blue. As you walk along the floor of the

great pit you can plainly hear the thermal springs and gas bubbling under your feet.

Some of the cinnabar makes splendid collectors' specimens. On my first visit to Sulphur Bank, a shovel was digging in a bank of hot and soft volcanic material, exposing large pieces thickly coated with brilliant red cinnabar crystals. I picked up several pieces, dodging the shovel bucket as I did so, only to find the crystals soft and pasty, so did not bother with any more as I figured they would be too damaged by the time I arrived home. This I greatly regretted because the crystals soon hardened. On the one piece I now have the crystals have become smaller due to atmospheric action, although in a cabinet. When I revisited the mine no more was to be found. During mining operations some of the cinnabar crystalline coating of rocks have been up to 6 ft. in length. It is to be hoped that at least one museum has such a sample.

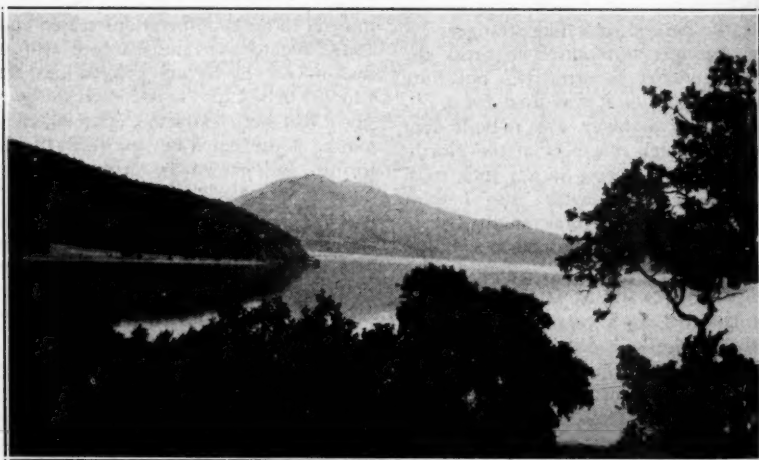
Among minerals found at Sulphur Bank are clear glassy gypsum; copiapite (hydrous sulphate of iron); epsomite; jarosite; melanterite; pyrite; light bluish opal and chalcedony; also crystals of olivine. I already have referred to aragonite.

One piece of ore I found had small pockets containing minute, highly polished steel-like needles, which I thought were rutile, but now understand may be stibnite, as the latter is found there. A L. Rogers of Lower Lake, who worked at the mine, has some lovely cinnabar crystal groups. He is or was a member of the Northern California Mineral Society.

R. W. Henley of San Francisco, who has been to Sulphur Bank mine since I was there, says that all the old mine timbers on which the onyx formed (travertine, he calls it) has been bulldozed away. Recently a hole was drilled there for testing ore body, and it became a geyser. Mr. Henley saw it erupt several times and now is kicking himself for having omitted to take a photograph of "New Faithful."

#### BAXTER QUICKSILVER MINE

On the slopes of Mount Knociti plenty of obsidian is to be found. Some houses have rock gardens of obsidian. At the old Baxter mine, six miles southeast of Kelseyville on the west side of the lake, the red cinnabar was found in fractures of rhyolite and obsidian. I have never visited this working nor the near-by



Clear Lake, Calif., with Mt. Knociti in background.

Under the shadows of this extinct volcano there are several mineral locations including the famous Sulphur Bank mine. Much banded and plain obsidian is to be found around the lake and at one point jasper is available in large amounts.



Lu-itta mine; but they may be worth inspecting, even if only for the obsidian. However, there has been no commercial operation for about 20 years. To reach these locations you have to go back to Lower Lake and take route 29, unless you continue right around the lake.

#### JASPER NEAR FOUR OAKS, CLEAR LAKE

Assuming that you continue along the eastern shore road from Sulphur Bank, which however, does not actually run along the water for a dozen miles because of a peninsula, you pass through Highlands and the village of Clear Oaks. Seven miles further on is the Four Oaks group of vacation cottages, where you can spend some pleasant days as they are on the waterside.

About a quarter-of-a-mile before coming to the cabins there is a small farm road to the right leading across grassland to two houses. To the left of the first house, is a huge boulder, very much weathered and about 50 ft. high. Close inspection will reveal that it is solid jasper. It is at the entrance to a small canyon, where most of the small boulders also are jasper. Some are white, others green, some green and white, and one of about 500 lbs. is a light blue jasper mixed with yellow-buff. This is the only blue jasper I ever have seen. In this canyon are tons of jasper for those who like making bookends, ashtrays and desk sets. I learned about the deposit when I noticed that the garden rocks at Four Oaks were small boulders of this material, and the landlord told me where I would find the deposit.

A piece of the blue stone was recently shown to Dr. A. F. Rogers of Stanford University and to a geologist of the State of California, and both termed it chert. Dr. Pough of the American Museum of Natural History, however, said that the green rock from the same location is jasper. Several years ago I had a piece of very dense and hard dark green chert from Red Rock Canyon, Mohave Desert, Calif., which took a very high polish and could not be scratched with a knife. While there was a resemblance when comparing fractured surfaces, they did not appear to be the same material. The green chert

from Red Rock I turned over to Julius Gisler of San Francisco, but do not know if it is still in his possession.

#### MANZANITA QUICKSILVER MINE

Other mines and dumps can be found in this 80-mile area, most of them abandoned many years ago. Between Clear Lake and Clear Lake Highlands a road, Route 20, turns right to Williams, and half way a county road leads to Wilbur Springs in Colusa County, where there are several quicksilver mines in the Sulphur Creek district. The largest is the Manzanita mine, which I believe is the one that can be seen from the paved highway, and which was operating in 1942 when I passed by. It should be worth exploring. There is an old quarry on the right hand side of the road, but this proved to be a mineral fiasco when a field trip was made there by the Northern California Mineral Society.

Before embarking on this mineral and vacation trip I recommend that County road maps be purchased in San Francisco, as well as automobile association road maps, as the oil company maps of California are on too small a scale.

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#### Rocks and Minerals Ranks High!

Editor R&M:

I am sending a renewal. *Rocks and Minerals* has been getting better and better until it has reached a very high degree of excellence.

I liked especially articles on an old geological report by Anthony Thurston and the accounts of early meetings of the New York Mineralogical Club. Those meetings seemed ideal in that they consisted of visits to members' collections and showing of members' specimens.

The ads are very good. I have bought quite a few things from them.

H. J. Swann,  
 Pawling, N. Y.

June 18, 1947

## THE TABLE MOUNTAIN ZEOLITES

BY GUY B. ELLERMEIER

1060 So. Gilpin St., Denver 9, Colo.

The Table Mountain zeolites at Golden, in Jefferson Co., Colo., are remarkable for their excellence and abundance. In a limited area here occur no less than nine different zeolites, together with the closely related apophyllite and the unrelated carbonates calcite and aragonite. Moreover, few mineral localities anywhere are more accessible to the collector.

The literature relating to the Table Mountain zeolites is replete with familiar names. Dana frequently mentions this locality in respect to zeolites. In 1885 Cross and Hillebrand (1) were first to make a detailed report with analyses. Since then Patton (2), Clarke and Steiger (3), Doelter (4)—text in German—and others have contributed much to the fund of knowledge pertaining to these interesting hydrous silicates.

Home of the Colorado School of Mines, Golden is a city of three thousand inhabitants located fourteen miles west of downtown Denver. Two highways and two trolley lines connect the cities. On the west, Golden is flanked by the foothills which quickly rise to the high Front Range, a link in the Continental Divide. The eastern environs of the city are dominated by Castle Rock, a commanding lava-capped promontory which terminates the west end of South Table Mountain. A little to the northeast rises North Table Mountain as a high mesa with steep slopes topped by almost perpendicular lava cliffs. The two mountains, separated by Clear Creek gorge, are so prominent that the visitor will require no assistance in recognizing either.

The two mountains possess similar topographic and geologic features. Like zeolites are found on both mountains, and in the literature they are designated as the "Table Mountain Zeolites" regardless of their exact place of origin. However, the writer feels safe in asserting that eighty percent of the zeolites reported have been taken from North Table Mountain, and that is the one he recommends to the collector.

### TOPOGRAPHY

North Table Mountain is a high lava-flow-capped mesa with very steep slopes topped by nearly vertical cliffs, the escarpment having an average height of 160 feet. From the plains the mesa appears quite level on top. In reality it is very undulating, the maximum relief being 290 feet. The highest point, a conical knoll in the west central part has been the subject of some controversy. Because of its conical form and platy structure many early authorities regarded the knoll as a closed volcanic vent from which the lavas radiated. The generally accepted opinion now holds that the knoll is an erosion remnant, the platy structure probably due to weathering. Like its companion across the creek, this mesa rises abruptly from the plains to a mean elevation of about 6300 feet. By comparison, the altitude of Golden is 5700 feet.

South Table Mountain is slightly lower than its neighbor, and the surface is somewhat less undulating. The highest point is at the west end near Castle Rock. On the south central side erosion has removed the vertical cliffs so that the slope is quite moderate, and a road here leads from State Highway 68 to the quarries on the summit.

### GEOLOGIC HISTORY

The Table Mountains are erosion remnants, the comparatively harder basalt cappings protecting the underlying sediments of the Denver formation. Geologically they are one mountain, formed by the same lava flows, their topographic isolation being due to the incision by Clear Creek which here forms a typical narrow. The bedrock of the immediate region is the Laramie series which, with older members of the Cretaceous system, may be observed along the reverse fault which, extending through Golden, follows the general trend of the foothills.

Following Laramie time the Rockies experienced a period of great erosion, the detritus fanning out to deposit on the adjacent plains 2000 feet of sediments, com-

posed of sandstones, clay and conglomerates, which comprise the Denver-Arapahoe formation, the lower 600 feet being assigned to the Arapahoe.

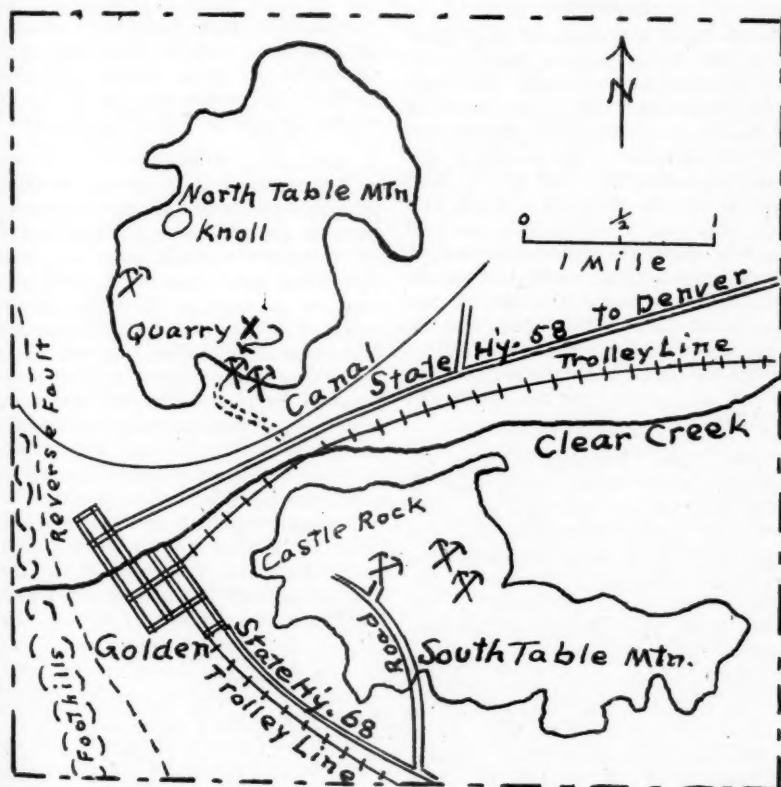
During mid-Denver time (early Eocene) basalt lavas were extruded from a vent now occupied by Ralston dike (5), a large intrusive body located about four miles north of Golden. There were three distinct periods of volcanism with their attendant flows, designated as Flows 1, 2, and 3.

Flow 1, less extensive than the other two, followed the southeasterly course of stream channels in the Denver sediments and probably did not extend beyond the northern limits of South Table Mountain. This flow is observable at but six or seven places along the periphery of North Table

Mountain where it outcrops to form benches about half way up the slope. Zeolites are not present in Flow 1.

Flow 2, most extensive of the lava extrusions, is separated from Flow 1 by 150 feet of Denver era sediments, and together with Flow 3 form the capping rock of both Table Mountains. This flow, over 75 feet thick, is characterized in its lower 50 feet by vertical columnar jointing in three dimensions, and is especially rich in zeolites. The upper 25 feet, being vesicular in structure weathers readily and has eroded back to form a narrow bench which distinguishes the top of Flow 2 from the solid base of Flow 3 above. Zeolites are quite prominent in this portion also.

Flow 3 rests in direct contact upon



Sketch Map showing the Table Mountains. Quarries are indicated by crossed picks.

Flow 2 and is featured by similar vertical jointing and by considerable exfoliation or spheroidal weathering in its upper portions. Zeolites are less abundant in this flow.

### PETROGRAPHIC FEATURES

In this area both the intrusives and extrusives vary from basalt to basalt porphyry, and are essentially of the same mineral composition—a feldspar lava. Observable in a rather coarsely crystalline groundmass of porphyry type are labradorite as phenocrysts up to 5 mm in length, augite in well-formed crystals up to 4 mm, and, more sparingly, olivine (peridot) either partly or completely altered to serpentine.

### QUARRIES

*South Table Mountain:* A large quarry is now being operated here by the Denver Highway Department. The writer has visited this quarry several times, but has found no zeolites, probably because the Department has selected a spot where the rock is more suitable for road purposes than it would be if filled with zeolite material. However, there are two large old quarries a quarter-mile east of the present workings where zeolites are fairly abundant, natrolite, analcite and calcite being the most prominent minerals occurring on the South Mountain. These quarries are indicated on the sketch map, and may be located from the road without difficulty.

*North Table Mountain:* There are three quarries on this mountain, none of which has been in operation for some years. The writer recommends the one designated as Quarry X on the sketch map. This quarry is located at the base of the cliff (in Flow 2) on the south side of the mountain. Here all types of excellent zeolites occur in abundance.

To arrive at this quarry drive about a mile east from Golden on State Highway 58. You will then be at the base of the mountain and little more than a quarter-mile from Quarry X, though the climb from road to quarry is arduous. An intervening irrigation canal need not deter

you since it is spanned by two footbridges. From below, the quarry is almost invisible, hardly more than a lighter colored strip of vertical wall appearing to indicate its presence. In reality it is a large quarry which may be identified on the spot by the quantities of zeolite material littering the floor and "pock-marking" the faces of the innumerable basalt blocks, slabs and boulders there.

Good specimens may be obtained here with no other tools than a large cold chisel and heavy hammer. A diamond-point and square-point (6) are recommended aids in cutting specimens from the rock. This basalt absorbs water readily, and by keeping it wet ahead of the work a diamond-point cuts surprisingly fast. It seems only fair to state, however, that the largest specimens are more likely to be obtained by blasting. A single charge well placed in one of the many ten to twenty ton boulders will expose more specimens than a man can trim to shape in a day's time.

### ZEOLITES

The minerals occur lining or filling amygdaloidal cavities, crevices and various irregular gas pockets in the basalt, some of the pockets being of great size. More often than not two or more varieties occupy the same cavity. In respect to their order of mineral deposition, Cross and Hillebrand divided them into two groups comprising eleven stages or periods of deposition. Patton however, who had an excellent opportunity for studying the Golden region, has this to say: "The zeolites, together with calcite and aragonite, as they occur here, indicate no less than fifteen stages or periods of mineral deposition." As a means for ready comparison, we set forth the conclusions of both authorities, in each instance the oldest mineral being named first, as follows:

#### Cross and Hillebrand

1. Laumontite )
- ) red
2. Stilbite ) or
- ) yellow
3. Thomsonite )
4. Calcite (yellow)
5. Stilbite

6. Chabazite
7. Thomsonite
8. Analcite
9. Apophyllite
10. Calcite (colorless)
11. Mesolite

## Patton

1. Laumontite
2. Stilbite
3. Chabazite
4. Thomsonite, type I
5. Apophyllite
6. Thomsonite, types II & IIa
7. Laumontite
8. Stilbite
9. Analcite
10. Thomsonite, type III
11. Calcite
12. Thomsonite, type IIIa
13. Mesolite
14. Analcite
15. Aragonite

When studying these minerals in their natural settings one finds that the "time tables" are more nearly in accord than a casual reading might indicate, and it is seldom difficult to decide whether a given specimen belongs to a primary or to a later generation. Notice must be taken, however, that neither Cross nor Patton has assigned a place in the series for natrolite, levynite or scolecite. Doubtless that is because these minerals seldom occur directly associated with other zeolites, so their places in the series are difficult to determine. Consequently, in describing these zeolites, the writer deems it most convenient for reader and author alike to discuss them in their alphabetical order rather than to follow either chronological table. Further, he will describe them in a manner that he hopes will enable the collector to identify most species in the field.

### DESCRIPTIONS

*Analcite* of the first generation occurs as white trapezohedrons, ranging from small up to 40 mm in diameter, averaging 15 mm. It sometimes occurs alone, or may be associated with natrolite or apophyllite, but is more often found implanted upon a coating of chabazite or on thomsonite of types I and II. Second generation an-

alcite occurs as small clear, vitreous crystals.

*Apophyllite* occurs in the habit of white, or pale green, opaque rectangular crystals with prisms terminated by basal cleavage or by acute pyramids. The crystals may attain a size of 12 mm, and are seemingly always associated with analcite.

*Chabazite* may form the lining of cavities upon which younger minerals are deposited; often it occurs in the habit of white, or rarely pink, crystals of simple rhombohedral form nearly cubic in aspect; as rhombohedrons twinned parallel to the basal plane, and as penetration twins. The crystals range up to 10 mm across, and may be both pink and white on one specimen.

*Laumontite*, the first mineral deposited, occurs as brown grains and as microscopic yellow crystals which, with stilbite as microscopic white crystals, and with tiny red thomsonite spherules, form stratified floor linings of large cavities upon which younger minerals are deposited. Patton's series indicates a second generation laumontite that the writer has not yet observed.

*Levynite* occurs sparingly alone in small cavities as white or colorless crystals in the form of six-sided tablets attached by an edge to the wall. Generally levynite and scolecite occupy closely adjacent cavities, but apparently are not found directly associated.

*Mesolite*, the daintiest and most beautiful of all zeolites, may occur as long extremely delicate fibers loosely matted together like tufts of cotton; or the fibers may assume the pattern of a filmy membrane; less often the fibers are straight and form tufts that resemble snow-white camel's-hair brushes. Mesolite may rarely be found implanted on analcite, but it is so often associated with thomsonite of types II and III that for many years it was believed to be a continuation of the thomsonite growth.

*Natrolite* occurs as dense clusters of needle-like transparent crystals, often stained black at the base. Though it may be associated with analcite, it usually occurs alone deposited upon the unlined

rock which it often bleaches to a lighter color for considerable depth.

*Solecite* occurs sparingly as spherules, or as small hemispheres, with radiating structure resembling thomsonite, type I, though it may be distinguished from the latter by its white color, satiny luster, and greenish spot at the center. It is seldom, if ever, associated with other zeolites.

*Stilbite* of the second generation occurs as transparent colorless crystals in the habit of elongated (up to 12 mm) six-sided tablets attached by an edge to the lining described under laumontite, which see also for first generation stilbite.

*Thomsonite* occurs in a wide variety of forms and is the most prominent mineral found here. Corresponding to No. 3 in the Cross series, are tiny red spherules, like bird shot, that help form cavity linings as mentioned under laumontite. Younger types are as follows:

*Type I* occurs as colorless prisms radiating from a common center to form solid spherules up to 14 mm in diameter; also as forming columns up to 30 mm high by radiation from an axis; further as thin walls with the blades standing at right angles to the crystal faces upon which they are implanted, the walls appearing similar to small leaves attached by an edge. Note: In describing these thomsonites the writer finds it convenient to use the term prisms, when more precisely, according to both Cross and Patton, the apparent prisms are actually prismatic aggregates built up of minute rhombohedral tablets.

*Type II*, instead of forming compact spherules, takes the form of delicate white prisms that may either taper to slender points or branch out like a bush. These prisms range in length from 5 mm to 15 mm, and may be found coating a cavity or deposited upon thomsonite, type I, or on chabazite. In type IIa the prisms, similar to above, diverge to form beautiful hemispherical tufts, the prisms tapering to hair-like forms. These hemispheres are often over 25 mm across, and are invariably separated from one another, the intervening spaces being filled with some other type.

*Type III* occurs filling small cavities, either nearly or entirely full, in which habit it forms solid white masses composed of radiating blades. In cases where the cavity is not completely filled, the blade ends form a roughly hemispherical surface from which some blades may extend by tapering out to fine points. In type IIIa the thin blades interweave to form a loosely compiled mass which is nearly always implanted on the hemispheres of type III.

#### CALCIUM CARBONATES

*Aragonite* occurs as a pure white encrustation on many zeolites, more especially on apophyllite and chabazite. This was the last mineral to be deposited.

Calcite occurs both as yellow and as colorless crystals, up to 75 mm in length, commonly in the form of a scalenohedron. They are associated with various zeolites, and are often coated with thomsonite or mesolite.

#### FLUORESCENCE

So far as the writer is aware, there have heretofore been no reported studies of the Table Mountain zeolites for fluorescence. Some years ago massive calcites from these basalts were tested for fluorescence by David Seaman (7), and results reported to *Rocks and Minerals*. Evidently Mr. Seaman's studies did not include zeolites.

Using a Mineralight, 120 zeolite specimens were tested, all being from Quarry X on North Mountain. Seventy-percent of the specimens fluoresced a lively yellowish-green, either wholly or in spots; phosphorescence lasting two or three seconds being observed at times. Specimens whose crystals were encrusted with aragonite invariably fluoresced, a fact that caused the writer to believe the phenomenon might be due to aragonite encrustations. Hence the following experiment was made.

Selecting a fluorescent specimen of chabazite crystals encrusted with aragonite, he carefully scraped the coatings from two crystals and tested the scrapings. The reaction came positive. The crystals were then cleaned of all trace of coating, and when tested the results were negative. This experiment seems to confirm the



writer's opinion, but should not be accepted as conclusive. He feels that here is a field for further study.

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### INTERESTING ROCK FORMATION IN OREGON

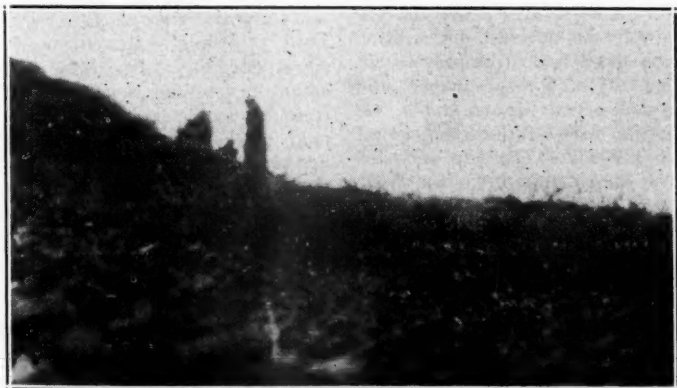
We are indebted to Howard S. Davis, of Sherwood, Oregon, for the following note relative to an interesting rock formation found by him.

"The enclosed snapshot may interest you. I came upon this group of rocks along the Deschutes River (in Wasco County of Northern Oregon) about a year or so ago. It was about dawn and the rocks—about 25 feet high—stood up against the skyline in silhouette with a most startling affect for they looked like real people in outline. Note the tallest figure—that of a woman with her head bowed in prayer and hands clasped under her chin. I called them "the Holy Family."

The rocks are composed of basalt and it would seem that at one time they were part of the cliff or rimrock up above and might have broken loose, rolled down and

come to rest on end as pictured. They show only the outline of a "weeping or praying woman" when viewed from one particular spot on the trail below. Move ten feet either way and the affect is lost—and if one climbs the slope and obtains a rear view, the "woman" then looks like a flat mass about as big as the end of an average barn.

There is considerable agate in this area, in geode and nodule form, also common opal. Perlite is very abundant, cropping out in many places where it could easily be mined with a bulldozer. This is the substance which, under heat, expands or pops somewhat like popcorn and a thriving industry has recently been set up near Maupin, Oregon, where it is made into an extremely light and fireproof wall-board."



The interesting basaltic formation in Oregon.



## GILLSON ON MEXICAN FLUORITE

BY CHARLES A. BELZ

Secretary: Philadelphia Mineralogical Society.

Dr. Joseph L. Gillson, Geologist for the DuPont Company, recently reported to the Philadelphia Mineralogical Society on "Fluorspar in Mexico." Dr. Gillson by no means restricts himself to mere technical discussion of his subject. With profound understanding and sympathy with their war time inhibitions, he indulges the incorrigible wandering proclivities of his fellow members. He knows that for many of his listeners such expeditions to foreign lands are nothing more than continued frustrations. A skillful narrator as well as an accomplished traveller, Dr. Gillson masterfully assumes the role of "Bringing the Mountain to Mahomet;" thus we find ourselves on a quiet evening on the Parkway, vicariously enjoying a mineral exploration trip to the interior of Mexico.

Dr. Gillson prefaced this tour with a brief explanation of the reasons for the trip. He sketched the economic importance of fluorspar, its critical nature as a war material, its importance in the metallurgy of aluminum, its particular need in the manufacture of Freon, the modern refrigerant and also the vehicle for DDT in the famous insecticide bomb used by the armed forces everywhere, and finally the threatened failure of our domestic resources. The necessity for an intensive search for new sources early in the war, was only too obvious. Dr. Gillson was commissioned by his company to undertake an exploration of known and suspected deposits in Mexico and it was this expedition which formed the subject matter of his talk. The trip included visits to all the important known fluorspar deposits in Mexico.

It would be impossible to mention more than just a few of the highlights of this most interesting journey. Among these was the visit to the Floating Gardens at Xuchomilco, a brief stop-over at Teotihuacan to marvel at the Aztec pyramids of the Sun and the Moon, the human-sacrifice arena of Cuidadella, and the Temple of Quetzocoatl. These are points

of scenic and historical interest which even a mineralogist couldn't ignore on a visit to Mexico.

The first Fluorspar deposits explored were in the Taxco District south of Mexico City, embracing the Azul Mine, and Gavilon mines and also those at Zacualpan in the same general area. Dr. Gillson explained that the Azul Mine had been the property of the Japanese, not at all well managed under their ownership despite the presence of some very formidable looking mine machinery. Following Mexican entry in the war, the property was seized for the government by the Alien Property Custodian, who promptly appointed a refugee from Central Europe as manager. After some obviously necessary changes in operations, a substantial production was soon achieved. The ore is associated with volcanic ash deposited in a sink hole which was created by the collapse of the roof over a cave in the limestone rock. Percolating waters caused a regional replacement of the limestone by fluorspar. The explains the close association of ore and volcanic ash. The Gavilon Mine in the same district is also a deposit of volcanic ash and limestone, with boulders of high grade fluorspar in considerable quantities.

Deposits of importance north of Mexico City visited were those in the Durango District. While in that vicinity Dr. Gillson stopped at the Iron Mine at Durango where he reported seeing excellent specimens of double terminated Apatite crystals. At the Coneto mine, the deposit is described as a rich vein estimated at 15 feet wide by 500 ft. long crossing a quartz dike, and yielding to 15 tons per day. Also of interest is the fact that this is the site of the first mint in North America, and some gold is still found here. The fluorspar deposit was discovered in 1942. The trip carried on through Torreon, the cotton growing center of Durango, to the limestone hill at Rosario where beautiful specimens of fluorspar are found. The ore at this deposit assays

better than 90%, and is hand sorted. At this place the miners live in a state of poverty which might be described as "abject" even according to Mexican standards. They live in cliff caves and are paid about \$1.00 per day. The manager and burros seem to be the only ones reasonably well fed. Boys under 10 years of age are used for sorting the spar by hand. On the same hill, but not at the same mine, high grade celestite is found. Shipments for this area, the production of about 400 miners, runs about 1,000 tons per month. Almost one-third of the fluorspar shipped from Mexico during the war came from the Colorado mine in northern Durango. It was shipped through Parral, a mining town in southern Chihuahua. Another vein of potential value is near Parral itself. It is about 30 feet wide as a maximum and it runs north and south alongside a quartz dike, and can be followed for hundreds of meters. The ore is about 70% pure and is mined with the silica, no high grade separation being attempted here.

In conclusion Dr. Gillson review the estimated huge demands for fluorspar in the manufacture of aluminum and in the chemical industry. The known reserves of fluorspar are by no means adequate to meet this country's anticipated requirements for these uses alone, without considering other demands for this essential mineral in the ceramic and metallurgical field. The Illinois-Kentucky area which has already produced 10,000,000 tons since 1860 is not expected to produce more than 250,000 tons per year as an average on the basis of present surveys. Hence our richest producing area is inadequate to meet future demands. All our western deposits are of lesser importance. South African and South American deposits are negligible. European deposits in Germany, France, and Spain are large, but of no help to this country. The status of German mines can only be conjectured at the present time. France can spare none of its own because of its huge program of reconstruction. The perpetual political situation of Spain is such as to stifle any hopes from that quarter. England has mines that have

been in operation since the days of the Romans, but she needs every pound of ore for her own use.

Newfoundland has very large reserves but these are relatively inaccessible and the mines have some serious production problems. Since our domestic reserves are dwindling rapidly, it is clear that large scale explorations must be undertaken to discover new sources (if these exist at all) as an only alternative to a far more costly search both for a material and a process to act as an adequate substitute.

### **An Opal Find in Tibet**

On another page of this issue, Baron Richard Johan de Touché-Skadding, in his interesting article "The Agni Mani—Magic Gem of the Orient," mentions exploring some of the mountains which lie northeast of the State of Kashmir, (Northern India), in Western Tibet. Somewhere in these mountains he ran across a small stream in which small pebbles of precious opal were found. These pebbles were grayish white on their exterior and wholly unattractive but when broken open some were a lovely blue while others were clear pieces with flashes of red, blue, and green. Unfortunately the exact locality of the stream bed is not known nor is there any record of precious opal being found before in Tibet.

At another locality, in southwestern Tibet, about 300 miles northeast of Kulu Valley, India, Baron de Touché-Skadding found on the same trip some lustrous black masses of obsidian, which occurred loose as small boulders. As far as is known, obsidian was never found before in Tibet so the boulders may have been brought to the spot where found by streams or ancient glaciers.

Some of this obsidian is dark gray and striped with almost black. A specimen was presented by the Baron to the British Museum, London, England, and Dr. Leonard Spencer observed that in his opinion it constituted a very rare specimen of obsidian.

## FOUR CORNERS COUNTRY

BY KARL HUDSON, Durango, Colorado

On January 24, 1947, in Durango, Colorado, a group of rockhounds met and organized a club. After much discussion Four Corners Rock Club was the name decided upon by which the organization was to be known.

Although to some the name "Four Corners" may signify a point, in fact the only point in the United States of America where four states meet at a common point, to many of us it means much more. It means a portion or "corner" of each state, Colorado, Utah, Arizona and New Mexico which meet at this point. It means a large area—much larger than many eastern states—containing more points of interest and more unique and beautiful scenery than any area of a comparable size in the United States.

From the lush "paradise valleys" of the canyons of Arizona and Utah to snow covered mountain peaks of Colorado this area runs the gamut of pictorial beauty and of interest to students of geology, mineralogy, archaeology, botany, palaeontology and kindred subjects.

The actual point at which these states meet is located on the Navajo Indian Reservation south of the San Juan River and northwest of Shiprock, New Mexico. It is reached by typical Indian Reservation roads and trails by way of Rattlesnake and Biklabito, from the Shiprock Indian Agency.

Within a radius of about 150 miles from this point lays America's most diversified scenic area. Very probably more square miles of scenic beauty on which white man has never set foot lays within this circle, than in any other area of like size in the United States. Although populated in its eastern portions, many of the canyons, plateaus and beautiful valleys of its western portion are as nature made them, inhabited occasionally by Indians, but unspoiled by white man's urge to change the face of this earth to his own idea of beauty. As the late Irvin S. Cobb once said there are grown up Indians living in this area who "never saw half a

dozen white people in their lives—and found that amply sufficient."

A lifetime could be spent in visiting the points of interest in the Four Corners Country and in exploring its isolated areas and the writer thinks it would be a lifetime well spent. He also believes that a few days—or weeks—or years spent in the area would be of great benefit to every person who feels the need of a change from the existence forced upon many by life itself. Those of us who live within the area are indeed fortunate.

In this great region everything in the way of scenery is to be had from the beautiful sandstone canyons such as the Colorado, and the San Juan, and many smaller canyons in the southwest, to magnificent mountain peaks over 14,000 feet in elevation near Needleton, Silverton, Ouray, Telluride and other old mining camps and towns. To attempt to describe each point of interest would be futile in anything short of volumes but a few of the more prominent places can be mentioned.

### Many Old Mining Camps In The Area

To the mineralogist the old mining camps with hundreds of abandoned mine dumps and many mines that are being worked are of interest. These mines are worked or were worked mainly for gold and silver and, although not to be found in commercial amounts, good specimens of many other minerals are often found among the gangue minerals thrown out on the dumps. The mines are found throughout the San Juan, Needles, La Plata, La Sal and other mountains.

### Minerals Abound In The Area

For the amateur gem cutter the extensive areas of silicification in Utah and Arizona supplies many semi-precious gem stones. Agates, agatized wood, agatized bone, garnet, peridot, jet and many other varieties are found.

### Area Of Great Archaeological interest

To the student of archaeology the area offers as first attraction the great Mesa Verde National Park. Nowhere else in

the southwest is there such a display of evidence of the culture achieved by our prehistoric Indians. Museums and guided trips to many of the cliff dwellings give one an understanding of the prehistoric periods in American culture which cannot be gained by reading alone. Aztec Ruins, Pueblo Bonito, and many smaller ruins also give evidence of this great culture.

#### **Geology Present On A Vast Scale**

To the student of geology the formations exposed by erosion in the canyon of the Colorado, and the San Juan Rivers, the volcanic intrusions in the La Plata and San Juan Mountains together with many other geological formations offer great interest.

#### **Fossils Also Abound**

The palaeontologist will find many kinds of fossil remains in the various formations exposed by erosion. The ancient shales of all four states carry fossils representing a long period in geological history.

#### **Flora and Fauna Numerous**

Students of flora and fauna will find many varieties of plant and animal life from those native to the semi-arid low country with an elevation of less than 4,000 feet in the southwest to those of the high areas with heavy rain and snow fall and reaching an altitude of over 14,000 feet in the mountains.

#### **A Camera Fiend's Paradise**

The whole area is a camera fiend's paradise, particularly for those using color photography. The vivid reds of the erosion sculptured Monument Valley with its wonderful sunset colors, the mighty canyons of the Colorado and San Juan Rivers, the purple sage of the open desert, the crags and perpetual snows of the mountain peaks, abundant wild life and pictorial valleys are all waiting for those who can bring their beauty to the photographic print.

#### **Indians Add Color**

The Navajo and Ute Indians add color to the south and western sections of the area by retaining their native customs of life and religion. For years a mis-guided government bureau has been trying to change these customs without success. Al-

though somewhat over-supervised the picturesque life of the old Navajo is not changed. The large number of government employees does not detract from the picture since they are mostly quartered in neat modern government built homes at the agencies and their sense of duty does not often carry many of them very far from these agencies and modern highways. The ceremonial dances and "sings of the Indians, when held far from the influence of the white man, is something never to be forgotten. You will find the Navajo generally distrustful of white strangers (not without reason) but you will also find him quick to judge your character and motives and once he is your friend you will find that he has a wonderful sense of reasoning and humor.

#### **Natural Wonders Abound Too**

Natural wonders abound throughout the entire Four Corners area. The Natural Bridges west of Blanding, Rainbow Natural Bridge far to the west, Canyon De Chelly, Monument Valley, Arches National Monument near Moab, natural hot springs near Durango and Pagosa Springs, Shiprock or the Flying Rock of the Navajoes in New Mexico, the little known but extensive fossil beds south of Aztec and Box Canyon and the Amphitheater in the "American Alps" near Ouray are a few of the most prominent.

The Needles Mts. and other peaks near Silverton, Ouray, and Telluride are considered by many mountain climbers as offering more thrill packed climbing in a comparatively small area than in any other section of the United States.

Although most of the Four Corners Area is criss-crossed by modern highways and most of its wonders can be seen from a modern automobile, the wild and beautiful country in its western part can only be entered by pack train or by boat trips on the Colorado and San Juan Rivers. Pack trips may be arranged at many ranches near the area and boat trips may be arranged at Mexican Hat and Moab, Utah.

While this is only a very general description of the great Four Corners

*(Continued on page 639)*

## THE NEW YORK MINERALOGICAL CLUB OUTING TO ROXBURY, CONN.

BY LEO N. YEDLIN

Tradition had it among Europeans coming to America that the streets were paved with gold. Not too far wrong were these hopefuls, for a substitution of Roxbury for America, and garnet for gold will prove the disbelievers were wrong in their hasty scoffing.

This was shown Sunday, April 27th, 1947, when the New York Mineralogical Club held its spring excursion to the famed siderite locality. A chartered bus transported a cargo of hammers, chisels and the collectors to wield them, and after being joined by those who traveled by private automobile a group of some 80 people descended upon the workings.

From the Roxbury railroad station the old dumps and smelter are about a quarter-mile distant, by way of several well marked old mine roads. The first thing that greets the collector is the ruin of the old furnace. Set among tall oaks and hemlocks, the towering structure, built with high Gothic arches, seems like an old castle, long since abandoned to the elements. Old slag piles abound, and the extent of the construction, dumps, tramways and access paths attest to a large scale operation. The discovery and operation of great deposits of oxide ores elsewhere, however, effectively closed this carbonate mine. The ample vegetation abounding, with healthy tall trees, indicates a minimum of sulphide ores, for sulphur fumes in any considerable quantity usually kill plant growth for miles around.

Immediately to the rear of the furnace is the remnant of the crusher. The building is completely gone, and the remaining timbers are so rotted that even termites are not to be seen. Here is the first spot for the collector. The foundations are of schist, probably brought from Roxbury Falls. Studding this rock in profusion are crystals of almandine garnet, giving the schist the appearance of conglomerate. The crystals are dull red, opaque, and usually weathered, tho some with edges and bright faces are frequently en-

countered. The predominant form is the dodecahedron often modified by the trapezohedron. Associated in the schist are good brown crystals, single and twinned, of staurolite.

About 200 feet further, on a higher level, the main ore dump is found. Hundreds of tons of siderite lie about, and the collector need go no further. Even tho people have visited this locality for years the pickings are superb. Select a likely spot (any spot) and commence vertical operations. Concentrate on ore in contact with quartz, as this material is frequently pitted and offers good specimens. Break open all ore showing streaks of pyrite, for fine crystals will come to light, embedded in the siderite. The common forms are the pyritohedron, cube and octahedron, in combination, and very choice specimens are encountered. It is characteristic of the locality that the pyrite found in the dark brown siderite has a bright red tarnish. That in the tan ore is bright, untarnished and yellow.

Small coffin-shaped crystals of arsenopyrite are available, and on occasion galena and a blue black sphalerite are intermingled with the carbonate ore. Limonite, pseudomorphous after pyrite, melanterite and hyalite are alteration products. One specimen of molybdenite, in quartz, is reported.

Another collecting technique (developed and perfected by O. I. Lee, and used successfully at Mt. Adam for allanite and here for loose crystals of pyrite and quartz) is to lie prone upon the top of a flat dump and sift the debris by hand. It is surprising how good the results can be.

From the top of this ore dump an old tramway climbs the mountain by easy grade to the mine adit. The distance is about a mile, thru woods of birch, oak and evergreens, past growths of cinnamon ferns, spring flowers and bright green mosses. A clearing is reached, and another ore dump extends from the mouth of the mine part way down the mountain. The view is magnificent. Far out



are the blue Berkshires, while below are the green winding valleys.

The same minerals are here found, but the sulphides are more profuse, tho never common. The siderite is less stained, and the pyrite crystals are all bright and sharp.

The mine is pas-able for a long distance, tho no collecting can be done comparable to that on the dumps. A cold draft of air emerges from the adit, and the visitor is quickly chilled.

Leaving the mine and returning to the railroad station another collecting area is located. Years ago the road around the station was filled with crushed rock. Hundreds of loose garnet crystals, single and compound similar to those previously de-

scribed, are collected, merely by poking along the roadside with a stick. Fifteen minutes suffices to fill anyone's needs.

Homeward bound the caravan proceeds south along route 7, stopping briefly in the rain at Branchville, Conn., and finding albite, curved muscovite, cymatolite, spodumene, torbernite, apatite, biotite, montmorillonite and black radiating tourmaline. Further south the group continues, thru Westchester and back to New City. A worthwhile day, well spent.

Editor's Note:—The famed Roxbury Siderite Mine is on Mine Hill in the little hamlet of Roxbury Station, in Western Connecticut. Roxbury Station (on Conn. 67) is 4¼ miles southeast of New Milford.

## NEWTON WILLARD HARRIS

April 7, 1888—April 23, 1947

It is with much sorrow that we announce the death of one of the Association's warmest friends and admirers, Newton Willard Harris, of Croton-on-Hudson, N. Y., who passed away April 23, 1947. Death was due to a sudden heart attack.

Mr. Harris was born in Portland, Maine, April 7, 1888, the son of Fred Ford Harris and Harriet Whitney Fox Harris.

Mr. Harris was a Veteran of World War I—224th Aero Service Squadron based at Croydon, England. He moved to Westchester County, N. Y., from New York City, early in 1922 and for the last 19 years made his home in Croton-on-Hudson (67 Irving Ave.). He was one of the oldest and most skilled employees of the Cambridge Instrument Co., in Ossining, N. Y., having been with them for 25 years.

But his interest in minerals went back much further. As a very little boy he used to trudge home with his pockets full of rocks. These pockets needed repairs continually from the sagging weights they had to carry. Minerals had a fascination for him that increased with time. As he grew older his specimens were more carefully selected and he acquired some very choice ones through the years.

On May 28, 1921, he married Aletha E. Comstock, of Yorkville, Oneida Co., N. Y. Mrs. Harris' father, Dr. Ira M. Comstock, a medical practitioner, had long been interested in minerals and had an excellent collection of them. Several years ago this collection was turned over to Mr. Harris which made him

very happy and his appreciation increased with the constant study he gave to it.

The Rocks and Minerals Association meant a great deal to Mr. Harris and he was a most enthusiastic member. He derived a keen enjoyment from the opportunities it afforded; indeed they seemed boundless. He was experimenting with gem stones and doing some fine work in cutting and polishing and both he and Mrs. Harris had dreams of working together at it, later. The children of the neighborhood loved to come and see his "beauty stones." Many a youngster has found, through him, a key to some of this earth's wonder and beauty.

Mr. Harris is survived by his wife and a son, Ira Whitney Harris, 23, a student at the University of Pennsylvania. Also surviving are three brothers, Ford W. of Los Angeles, Calif., Edmund H. and Don, of Yarmouth, Maine, and a sister Mrs. Alice H. Ferris, of Detroit, Mich.. A niece, Deri Ferris (now Mrs. Kenneth Jenkins), was for several of her school years, a member of his household.

To Mrs. Harris, and son, and to all his relatives, the Rocks and Minerals Association extends its deepest sympathy and joins with them in mourning the loss not only of a husband, father, brother, and uncle, but also of a warm friend of our organization.

(Mrs. Harris is continuing the membership in the Association under her own name and the fine mineral collection will be kept intact for at least a few years longer).

Peter Zodiac



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## THE AMATEUR LAPIDARY

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### SOLUBLE OIL LUBRICANT FOR DIAMOND SAWING

BY ROLAND O. BETTERLEY

817 Queen St., Pottstown, Penn.

Three years ago I became interested in cutting and polishing minerals. At first I was content to break up material with hammer and chisel into pieces of usable size. However, I quickly realized that this method was not only wasteful of good material but entailed much extra work in grinding to shape with consequent needless wearing out of grinding wheels. So, sawing of material seemed next in order. Mud sawing is rather a crude method and slow as well—diamond sawing appeared more efficient. I purchased a couple of "reject" saws from a well-known advertiser in *Rocks and Minerals* and a copy of *Dake's Art of Gem Cutting*. After due study of the latter useful manual, I decided to design and construct my own apparatus. Being a professional mechanical engineer and a trained mechanic, this was not too difficult to do and in due time I was ready to slice stones.

As a lubricant for the saw, I followed instructions, using the conventional kerosene and oil mixture. This, of course, worked well but I didn't like it. Too messy. Too much scrubbing of my person and clothes as well as of bench and shop, etc. The fire hazard, too, was a factor. But what to do about it?

I had been collaborating with the chief metallurgist at the plant where I am employed in research into cutting compounds for use in the numerous metal working operations involved in production of our product. The grinding of hardened steel parts seemed a fairly close parallel. I consulted my associate about it. We had long since discarded use of kerosene and other raw mineral oils, vegetable and animal oils, the various soap-type formulas, etc. We tried out most of the so-called "soluble oils" and "emulsifying oils" available as cutting

compounds. A few of these "had what it took." They proved cheap, highly efficient, non-inflammable, and less messy than straight oils.

I began a series of experiments with these compounds for diamond saw cutting. It proved to be *not* "just any" soluble oil but one make *only* which stood all tests. This one worked well from the beginning except for one factor. Part way thru the cut, the saw would jam. Examination showed a black, pummy deposit on saw and stone—the mixture was breaking down and depositing heavy oil in the cut. Analysis showed up that the ultra-fine mud from the saw-cut did not settle out quickly and was being carried back into the cut by the saw, apparently generating undue heat which broke down the compound. More consultation, plus elaborate laboratory analysis of used compound.

The answer came up—hard water. We had been using well water in making up the compound and this contained minerals which apparently were preventing the formation of a stable and complete emulsion, i.e. the oil would not remain in solution under heat and pressure of the cut. To prove it, we tried using distilled water—trouble vanished—sludge settled out rapidly. The emulsion was complete and stable. No more gumming on saw. No more jamming of saw in cut. Then we tried adding a water softening compound to the well water—that worked as well as the distilled water.

So, all went well for a time—then suddenly the trouble apparently returned. More tests showed up that the compound had become acid and evidently by chemical reaction with the material being cut (quartz minerals, mostly) and was forming an acid mineral soap which deposited in the cut. Adding a little soda ash

(about a teaspoonful per gallon) corrected *that* trouble and the problem was solved.

Later research brought out an improved water softener compound, which, in connection with a teaspoonful of 80% soda ash per gallon, resulted in an entirely stable compound which has withstood the most severe test. I now have a soluble oil compound which works as well for diamond sawing as the kerosene and lubricating oil mix ever did. And it also is cheap, non-inflammable, washes off readily (usually in clear water only). A slight tendency to rust exposed parts of the apparatus was readily cured by the addition of a few drops of rust-preventive.

Relative cost? The soluble oil which I am using is mixed in the proportion of one part oil to 50 parts water. To this I add one ounce of water softener compound, one teaspoonful of 58% soda ash, 15 c.c. of a 25% solution of sodium nitrite (rust preventive) per gallon of cutting compound. The oil may be had at \$1.00 per quart (cheaper in larger quantity). That makes 12½ gallons of cutting compound at a cost of 8c per gallon—water softener, soda ash and sodium nitrite add 2c per gallon to this cost, or a total of 10c per gallon. If rainwater or other soft, pure water is available, of course the water softener may be omitted. The lubricating oil and kerosene mix costs about 33c per gallon (kerosene 10c per gallon, lubricating oil 80c per gallon—using one part oil to two parts kerosene).

Diamond saws stand up and wear as well with soluble oil compound as with the oil-kerosene mix—I've had no trouble from that source. Cutting speed is about the same for both mixtures.

Soluble oil compound, I find, is advantageous also in rough and finish grinding with silicon carbide wheels. It keeps wheels cleaner than plain water does, also reducing heat generated—both factors, of course, tend to speed up this process with less wear on wheels. In this connection, too, a large proportion of water (up to 75 parts) can be used with-

out loss of efficiency. A thin trickle of compound directed close to contact point of work on wheel is entirely adequate.

I have not yet tried out this compound for lapping and polishing but believe it should work out advantageously. I intend to try it out as soon as possible. I believe it should also work out well for facet work—roughing, finishing, and polishing.

I shall be glad to correspond with any *Rocks and Minerals* reader in regard to this subject of soluble oil compound.

## DR. DANIEL E. WILLARD

### (Obituary Notice)

Dr. Daniel E. Willard, a well-known author and geologist and a most prominent member of the Minnesota Geological Society, died April 1st at Nebraska City where he lived. He was 84 years old and active until the last day. Dr. Willard had a long useful and very interesting life, as well as a busy one. He was born at Nile, New York, where he spent his boyhood days. He walked twenty-five miles to enter college at Alfred, New York, from which he later was graduated. He taught school for several years, then took his Master's Degree at Chicago University. From there he went to North Dakota and taught in the State Teachers College at Mayville. It was during this time that he wrote his first book, "The Story of the Prairies." Much of the preparation of this was done on trips with his students using a bicycle for transportation. He later wrote, "The Story of the North Star State," which is the geological history of Minnesota, "Montana, The Geological Story," "Adventures in Scenery," the story of the geology of California. At the time of his death he had completed the manuscript for "The Center of the United States." He also wrote a chapter for the book, "The Coast Ranges," edited by Roderick Petti, and had finished, also, a book, "Prairie Yarns," which is not yet published.

He taught Geology at the Agricultural College at Fargo for ten years. He did geological work also for the Government, the Northern Pacific Railway Company and many others. He was recommended for a fellowship in The American Geographic Society. He was honored by The American Association for the Advancement of Science, and in 1912, was honored by his Alma Mater with the degree of Doctor of Science.

He was married to Mary Davis, who taught with him at the State Teachers College. Dr. Willard is survived by his wife and his son Daniel.

Minnesota Geological Bulletin, May, 1947

## Baron Richard Johan De Touché-Skadding

Baron Richard Johan de Touché-Skadding is the descendant of an old French family, whose ancestors belonged to the Templar knighthood and fought in the Crusades. In the 16th century the family intermarried with the Bourbons of France, when King Charles IX, responsible for the massacre of St. Bartholomew, espoused the Marquise Marie de Touchet.

The Baron who was born in Riga is a man of versatile interests and many abilities. He has served in his country's diplomatic corps in Berlin, Rome, and at the Vatican. In the Far East he represented American industrial interests. He is interested in Indian art and actively participated in its modern phase of development as a member of the Managing Committee of the Bombay Art Society. His contributions to Indian history and archaeology, ranging from the study of old manuscripts to the discovery and excavation of ancient sites, have been the substance of his lectures and publications at the Royal Asiatic Society, of which he is a member. As correspondent of "The Times of India," he has contributed articles on topics ranging from politics and war strategy to fine arts and languages.

In his 27 years of residence in Asia he has collected many priceless art objects and amazing archaeological and mineralogical specimens from China, Indonesia, and India. In addition to ivory, bronze, wood, and stone statuary, rare textiles, ancient weapons, and historical rings, Baron de Touché-Skadding possesses one of the largest rock crystal balls in any private collection and has acquired the Oriental art of crystal gazing. He possesses the unique and rare meteoric gem, Agni Mani, the talisman of the Orient.

Baron de Touché-Skadding is of athletic build and more than average height. His courtly old-world manner and clear-cut, direct way of speech assures his immediate popularity with any lecture audience. In addition to his hobby of collecting objects d'art, he is an author. He is at present completing a novel based on some of his experiences in the Orient.



Baron Richard Johan de Touché-Skadding.

It is a pleasure to announce that Baron de Touché-Skadding is a mineralogist of note and that he has a nice collection of minerals found in India, Java, Tibet, and elsewhere. He is especially interested in Agni Mani—the Magic Gem of the Orient, and his intensely interesting article which appears in this issue is the text of the lecture given by him to the New York Mineralogical Club on Feb. 19, 1947.

We hope that Baron de Touché-Skadding may find time to prepare another article, and perhaps several of them, on some other interesting minerals that he ran across on his many travels through the Orient.

### Neither Can We!

Editor R&M:

I am enclosing check to renew my subscription for *Rocks and Minerals*, and cannot think of a better way to spend \$3.

Odette Golden  
Yonkers, N. Y.

June 6, 1947

## CLUB AND SOCIETY NOTES

*Attention Secretaries*—If you want your reports to appear in the September issue, they must reach us by August 20th—the Editor.

### Mineralogical Society of So. California

The sixteenth annual meeting of the Mineralogical Society of Southern California was a picnic held at Oak Grove Park in Pasadena, Sunday, June 8th, 1947. After a delicious picnic luncheon, a brief business meeting was called by the President, Mr. Gene Linville. Mr. Linville reported that there were 211 active members of the Society and that 33 had been taken in as new members during the past year. He thanked all the officers for their fine co-operation in the performance of their various duties. When the meeting was opened for nominations for new officers for the coming year, it was unanimously voted to reelect the present officers. Those serving a second year are therefore: Mr. Gene Linville, Pres.; Mr. H. Stanton Hill, Vice Pres.; Mrs. Dorothy Ostergard, Sec.; Mr. Don Stevens, Treasurer.

Mr. Ernest Chapman, as chairman of the Judges committee which was to award prizes for competitive exhibits, awarded the ribbons. In class one—Minerals of all types—Mr. Lee Seabridge won first place and Mr. Louis Vance second. Class 2—Crystals—Mr. Earl Calvert first place, Mr. Jack Rodekohr second. Class 3—Polished materials—Quita Ruff, first with Mr. and Mrs. John Clark second. Class 4—Jewelry and Novelties—Mr. and Mrs. John Clark first and Quita Ruff second. In the Localities exhibit, Mr. Stanton Hill won first place with his fine collection of minerals from the British Isles and Mr. Don Stevens second with his beautiful collection of Mexico minerals. The Guest exhibit was won by the Dana Club of Pasadena Junior College and the Junior Collection first prize went to Rodger Stevens, 8 years old. Mr. Chapman stressed the high quality of all exhibits and indeed it was a real treat for all those present to see the many rare and beautiful minerals displayed.

Election of the Board of Directors of the Society was held with the following Directors chosen—Mr. Don George, Mr. Jack Streeter, Mr. Louis Vance, Mr. Ernest Chapman, Mr. Willard Perkin, Mr. Victor Robbins, Mr. Jack Rodekohr.

Mr. Ernest Chapman and Mr. Jack Streeter then spoke briefly of the coming meeting in Salt Lake City which they were to attend and where it is hoped the groundwork for a national Federation may be laid. The afternoon concluded with an auction of mineral specimens, many independent trades between members of the society, and general "rock talk."

Pauline A. Saylor  
Covina, California

### Los Angeles Lapidary Society

At the July meeting the Los Angeles Lapidary Society enjoyed a motion picture shown by Mr. H. L. Monlux of his recent trip to Alaska. The unusually good shots of rocks and rock formations of the Alaska area were of particular interest to the members and guests. Mr. Monlux, an authority on the polishing and shaping of Montana agate, is now working on a new phase of the lapidary art among amateurs, that of thin sections for slide projection. Although July was one of the vacation months, a record attendance of members and guests were present.

Mr. Leland Quick, historian of L.A.L.S. and editor of the new LAPIDARY JOURNAL, read the history of our past year. As each accomplishment of the Society was reviewed we all had a deep feeling of pride for the organization.

THE FACETEERS, a branch of the L.A.L.S. devoting their hobby time to the art of faceting, held their July meeting at the L. A. Museum in Exposition Park and voted to continue their studies during the summer months. The project cut of the month, a "novelty reverse cut" stone was displayed by each member and such problems as polishes, angles and the materials used for this project were discussed. The group inspected several new faceting heads on display that incorporated many new developments which should simplify the cutting of faceted stones. These amateurs are doing much for the advancement of the lapidary art.

THE JEWELRY GROUP of the L.A.L.S. held their meeting at the Griffith Park Playground and also plan to continue their studies through the summer. This group of enthusiastic members are learning to set their lapidary work into well designed mountings of silver and gold under the very capable guidance of Mrs. Jessie Q. Chittenden, Art-Craft teacher at Pasadena Jr. College and a member of the Society.

Willella Gunderson,  
Publicity Chairman

### Mineralogical Society of the District of Columbia

A regular meeting of the Society was held on June 20, 1947, in the U.S. National Museum, Washington, D. C. The program consisted of a talk on minerals by the President of the Society, James H. Benn, and one on crystallography by Maj. E. D. Taylor.

### **Pomona Valley Mineral Club Pomona, California**

At the June meeting of the POMONA VALLEY MINERAL CLUB, Jerry D. Lauder-milk—well known geo-chemist and writer—talked on "FOSSILS." He depicted and explained the geological time scale by correlating it with the hours on a clock—each hour representing a stage of the geological eras. As the geological hand of time traveled from one hour or era to the next—over a period of not less than 500,000,000 years—it also slowly wrote the history of the forms and conditions of flora and fauna at the different periods in the world's history.

Each geological era has been characterized by some special form of life—which at that time reached its highest development. Not until the Precambrian era—which would be found on the geological clock before 6 A.M. were there evidences of fossils. These were of the lower orders such as bacteria, algae and perhaps seaweeds among plant life and protozoa among animals. From these simple forms, both vegetable and animal life increased in complexity and importance as conditions for the existence of higher orders appeared.

From the Precambrian era on through to the Permian period—which would be found on the geological clock between the numerals 9 and 10 A.M.—and which represented many millions of years—fishes reached their highest development and vertebrate animals appeared. However, with the advent of the Permian period, drastic changes resulted which we know as the Permian Revolution. Many species of both fauna and flora, subjected to either long droughts, or long cold periods, or because of being submerged in bodies of water became extinct. Vegetation decayed, but leaves, trunks and fruit left their imprints and story locked in the rock formations of the earth. Members of the animal kingdom met their doom likewise, but their footprints, bones, tusks, etc., were likewise preserved. Thus fossils originated.

Of what use are fossils? They have been very helpful agents in dating ancient strata and have given us much information regarding the evolution of the flora and fauna of the world. The little microscopic fossils known as "forams" (foraminifera) are found in the formation of oil beds. While their presence is not always a sure sign of oil, they bear an important relation. These small microscopic animals perhaps perished on what was once an ocean floor. The water being too deep for any oxidation, the result was petroleum from chemical changes in the organic matter of myriads of forams. Many of the formations of the present oil beds were once bays or tributaries of the ocean where the water was particularly rich in forams. The Cliffs of Dover are com-

posed principally of the fossil shells of foraminifera.

One of the later fossilized animals that have been found is the giant ground sloth. Interesting claws, bones and hair have been found in Northern California as well as in the Gypsum Cave in Nevada and Rampart Cave in Arizona.

Mr. Lauder-milk mentioned the Crestmore, Jensen and Colton Quarries as evidences of great pressure and heat—crystallizing the fossiliferous limestone into calcite. A fossil coral from the ancient sea which once covered this territory was found there.

Occasionally some species of animal, fish or tree—that is supposed to the extinct—is still found. In 1938, near the town of East London, South Africa, some fishermen drew up from a depth of twenty-five fathoms of water, a five-foot, bright, indigo blue fish weighing 127 pounds identical with fish that had supposedly become extinct during the Jurassic age.

A native in South America once maintained that he followed a giant ground sloth to its lair. The ginkgo tree also escaped complete extinction; many of them are now growing in California gardens.

Edythe M. Thompson  
Pub. Chm.

### **Chicago Rocks and Minerals Society**

At the June meeting of the Society, Edwin Goff Cooke gave a lecture on the rock formations and erosive action in the Southwest, and showed movies of the area, including Grand Canyon, Monument Valley, and Mesa Verde. The film was enhanced by appropriate music. The group was pleased with the sound geological information which Mr. Cooke presented and the superb artistry of the movie presentation. His charming wife, and daughter, too, assisted on the mechanical end.

O. Grand-Girand  
Chicago, Ill.

### **Mother Lode Mineral Society (Modesto, Calif.)**

At the May meeting of the Society, we had a very brilliant speaker with us, Dr. A. F. Rogers, Professor Emeritus of Mineralogy at Stanford University. Dr. Rogers is a well-known authority on mineralogy. He spoke on the "Romance of Jade" (perhaps, because of his keen interest in the Chinese Relief Program). He showed many beautiful pieces of jade, also many slides of specimens which were on display at the World's Fair at Treasure Island. He had several of the hand carved pagodas which many had seen in the "Chinese Village" at Treasure Isle.

Mrs. Lois Wemyss  
1310 Tuolumne Blvd.,  
Modesto, Calif.



### North Country Mineralogical Club

The regular meeting of the North Country Mineralogical Club was held on Thursday evening, May 8th. Two members of the club presented the program.

Miss Louise Hoxie, librarian at the Plattsburgh State Teachers College, discussed garnets. She explained their physical and chemical composition, mentioned places throughout the world where they may be found, with special emphasis on sources in the Adirondacks and the Champlain Valley, and traced their history through the centuries.

Fossils were discussed by Miss Judith Manwell, a junior high school student of the P.S. T.C. Laboratory School, who explained what fossils are, how they formed, and where they are found. She told of an especially good spot for "fossil-hunting," on Cumberland Head, near Plattsburgh.

Both speakers presented specimens and pictures to illustrate their talks.

During the business meeting, it was voted to change the regular meeting night from the second to the fourth Thursday in each month, hoping to avoid conflicts with meetings of other organizations whose members might be interested in attending our meetings. The resignation of Miss Jean Hoeffler as treasurer of the Club was accepted with regret. Miss Hoeffler is moving from Plattsburgh. Her interest and active support will be much missed. Mr. Arthur Sandiford was elected as treasurer.

Two field trips of the Club were held during May. On Sunday afternoon, May 11th, Mr. Fred Carnes of Ausable Forks was our host. Mr. Carnes showed his extensive collections of minerals, giving many unusual samples to those present. He also demonstrated his lapidary equipment and displayed stones suitable for jewelry, at various stages of being prepared and polished. Later, under the guidance of Mr. Carnes, the members went to a point across the Ausable River where they saw a large "fold," a strange rock formation which has received considerable attention from state geologists. Further specimens were obtained there.

Our first all-day field trip was held on Sunday, May 25, when over 30 members and friends attended. The group went first to the wollastonite and garnet mine operated by Mr. Koert Burnham near Willsboro, N. Y. Here we ate a picnic lunch. In "prospecting" for specimens, those present found excellent samples of almost pure wollastonite, as well as ones in which that mineral was mixed with garnet and with green diopside. They also found some large garnet crystals and brilliantly-colored examples of rainbow garnet. Later in the afternoon, most of the group went on to Essex, N. Y., to the wollastonite processing plant. Mr. Burnham, who had helped in identifying specimens at the mine, demonstrated the various steps in preparing the mineral for commercial use. He explained that it has been used in making welding flux, insulating build-

ing board, and fire brick for furnace linings.

Regular meetings of the North Country Mineralogical Club will be continued throughout the summer, at 8:00 p.m., on the fourth Thursday of each month, in the lecture room of the Plattsburgh Public Library, Plattsburgh, N. Y. Any mineralogists vacationing in this region will be cordially welcomed at the regular meetings, as well as on any of our field trips. Information about the latter, as they are planned, may be obtained from the president of the Club, Mr. William R. Ellsbury, Keeseville, N. Y., Telephone 113-F-2.

Gertrude E. Cone, Secretary

### Los Angeles Mineralogical Society

Dr. John Herman, chemist and assayer, gave an interesting talk on minerals of the atomic age to the Los Angeles Mineralogical Society at its May meeting. He stated that iron remains our most important metal while aluminum is running it a close race in its economic uses. Properties of matter are changed by nature where heat, light and electricity played an important part. Matter is supposed to consist of miniature solar systems where the electrons revolve around a nucleus. The supposition that atoms possess energy can be illustrated when some mineral substances are examined under a high powered microscope and exhibit the so called Brownian movement in the liquid colloidal state. Power as energy are different forms of mass and mass and energy are interchangeable. Dr. Herman gave some figures to show when a mass weight was stripped of its electrons, how its weight attained astronomical proportions. In medicine, the new atomic minerals are put to use in bombarding minerals with their radiations and administering the irradiated minerals into the human body where they serve as tracer elements and excellent X-ray photographs obtained of various organs.

The polarograph is now being used with varying degrees of success in the determination of the presence of cancer in the human body. Fluorescence in minerals is primarily due to light waves entering same and being changed to a shorter wave. Dr. Herman concluded his talk by discussing the probable and possible uses of atomic energy in the near future.

A. G. Weigel, Pub. Chm.

### New Jersey Mineralogical Society

A regular meeting of the Society was held on June 9, 1947, in the Recreation Room of the City Hall, Plainfield, N. J. The speaker was Dr. Frederick H. Pough, of the American Museum of Natural History, whose subject was "Mineral Localities of Brazil."

### Pacific Mineral Society

A regular meeting of the Society was held on June 13, 1947, in the Chancellor Hotel, Los Angeles, Calif. The speakers were Mr. & Mrs. Allard whose subject was "Kodachrome pictures of minerals and their fluorescence."



### Southwest Mineralogists

Southwest Mineralogists walked away with the California Federation plaque again this year. The group won first prize for their mineral exhibit at the State Convention held at the Fleischmann Auditorium in Santa Barbara, Calif., May 23, 14, and 25.

W. A. Clarke, former president of the club, made the oak chest that displayed the club minerals; he was assisted by H. W. Collins, new vice-president. The chairman of arranging the minerals for the show was headed by Mrs. Alwilda Darrt; much credit goes to Mrs. Darrt and her committee for their many hours planning the club display.

Other prizes were won by O. C. Barnes for his lapidary craftsmanship of Death Valley onyx lamps and bowls, and to Charles Cook for his jewelry craftsmanship.

At the mineral auction that was held on the last day of the convention, H. W. Collins, Gladys Eales, J. M. Ruddy, Victor Arciniega, Harold Lippitt, Ernest Chapman, C. C. Potter, and Norman Cupp won prizes.

Marian R. Nowak,  
Corresponding Secretary

### Central Iowa Mineral Club

A regular meeting of the Club was held on Fri. June 6, 1947, at Drake University, Des Moines, Iowa, at which L. M. Peterson led a Round Table discussion of vacation rock hunting.

On Sun. June 8th, a field trip was held to nearby clay pits.

### Northern California Mineral Society

Two meetings of the Society were held during June, 1947. On June 5th, a business meeting was held at 422 Belvedere St., San Francisco, Calif. On June 18th, a general meeting was held in the Public Library.

Each week, on Thursday, a lapidary night is held at 422 Belvedere St.

### Texas Mineral Society

At the regular monthly meeting of the Society, held June 10, 1947, the following officers were elected:

Asa Anderson, President  
Raymond McIver, Vice-President  
Ralph D. Churchill, Sec. & Treas.  
B. Salas, Director  
Fred Bentley, Director

The following Directors were held over:

Mrs. Robert Peck  
J. D. Churchill  
Ralph D. Churchill, Sec.

### Boston Mineral Club

At the June 3, 1947, meeting of the Club, Dr. Wroe Wolfe of Boston University gave an excellent talk on the minerals of the Palermo mine in North Groton, N. H. This locality is perhaps the most interesting in New England and especially noted for its many rare phosphate minerals.

### Cleveland Lapidarist Society

The Society meets on the first Tuesday of each month in the Auditorium of the Arcade, Cleveland, Ohio. The membership is open to any person interested in Gems. At the present time we have about 40 active members, half of whom are interested in cutting Gems, the rest of the members are either collectors or dealers in Gem stones. Mr. Frazier of the American Gem Society gave an extremely interesting talk on the commercial aspects of the Diamond, its occurrence, mining, and historical lore.

The next meeting will be held July 1 at which time Mr. Fred Lee of Lee Lapidaries will talk on the cutting and polishing of synthetic stones. Dr. Turebinski, Crystallographer for the Brush Development Company, will give a demonstration on the identification of gem material using as a subject a piece of much discussed American (Jade or Green Quartz).

J. W. Farrington, President of the Society, extends an invitation to all persons interested in Gems to attend our meeting. For further information write Harold L. Bejcek Secretary, 4802 Maplecrest Ave., Parma 9 Ohio.

Harold L. Bejcek, Sec.

### Marquette Geologists Association

A regular meeting of the Association was held on June 7, 1947, at the Chicago Academy of Sciences, Chicago, Ill. The main feature of the meeting was the showing of two color motion pictures on Grand Canyon and Yosemite National Park, by Mr. Scanlon.

### San Diego Mineralogical Society

A regular meeting of the Society was held on June 13, 1947, in the EPCA Hall, San Diego, Calif. The speaker was Roy Warren whose subject was "The fluorescence of minerals under ultra-violet light."

### Rocks and Minerals Club of Woodstock, Vt.

On June 6, 1947, the 5th regular meeting of the Club was held. We were organized in April, of this year, for the purpose of studying and spreading mineralogical knowledge. Meetings are held semi-monthly on the 1st and 3rd Friday evenings. In recent meetings, papers have been presented on mineralogical recognition, specimen cataloging and display, the geological periods of the earth's development, and the proper authoritative texts on geology.

On May 31st, the Club members visited the Elizabeth mine of the Vermont Copper Co. on the first field trip of the year. A valuable day was spent on the dumps and tailings piles in the early strip mine area, and in the flotation mill.

We will welcome all cooperation and interest from other clubs and individuals.

Ronald W. Gallup,  
Club Advisor  
Woodstock, Vt.

**Colorado Mineral Society**

The following field trips will be held during the summer months.

June 22nd. Monument, Colo. Jasper and agatized material suitable for cutting and polishing.

July 4-6. Gunnison, Colo. Tourmaline, beryl, and other pegmatite minerals, and garnet.

Aug. 10th. Gold Hill, Colo. Many rare minerals are found in this area.

Aug. 31-Sept. 1. Nathrop, Colo. Garnet, topaz, obsidian.

**Nebraska Mineralogy & Gem Club**

The annual picnic of the Club was held on Sun. June 15, 1947, at Antelope Park, Lincoln, Nebr.

**Hollywood Lapidary Society  
(Hollywood, Calif.)**

At a recent meeting of the Society, President Ronald MacCorkell gave a very interesting talk on the optical properties of gem stones. Herbert L. Monlux gave a splendid talk on the technique of cutting and polishing gem stones. James C. Arnold spoke on the preparation of star quartz in a most instructive manner.

Harry R. Ringwald  
Pub. Chm.

**American Gem Society  
(Northern Ohio Guild)**

A regular meeting of the Guild was held on June 10, 1947, in the Hatch Building, Western Reserve University, Cleveland, Ohio. A lecture by Dr. Henry F. Donner, of the University, was the main feature. His subject was "Use of the microscope and finding of interference figures."

**BIBLIOGRAPHICAL NOTES****Kraft Foods Head Writes About  
American Jade**

James Lewis Kraft, Chairman of the Board of the Kraft Foods Corporation, prominent figure in the International Counsel of Religious Education in Chicago and collector of American jade, tells about his fascinating hobby in a newly published book **ADVENTURE IN JADE**.

**ADVENTURE IN JADE** is full of interesting material Mr. Kraft has collected over a period of years. "Several centuries before Christ, a minister of state asked Confucius why jade, of all stones, was most highly to be prized by modern man. The great philosopher answered; 'Like virtue, though faulty, it does not hide its good points: when superior, it does not conceal its defects.' The ancient Chinese Book of Rites gives a partial answer to the hold of jade upon the imagination of man: 'It is of warm, liquid and moist aspect like benevolence; it is solid, strong and firm like politeness; when struck, it gives out a pure far-reaching sound, vibrating long but stopping like music; like truth it gives out a bright rainbow; it shows a pure spirit among the hills and streams; and in the whole world there is no one that does not value it.'

Mr. Kraft has pursued his hobby as vigorously as a big game hunter pursues his quarry. He has traced rumors all over the country and has helped discover jade in many sections. Jade has been found in Wyoming, California, and in various parts of the Rocky Mountains and in Alaska. Mr. Kraft's book tells the whole story in a friendly informal manner.

An intensely religious man, Mr. Kraft has directed that all royalties from the sale of **ADVENTURE IN JADE** be given to religious and charitable organizations.

Published by Henry Holt and Company, 257—4th Ave., New York 10, N. Y. Price \$3.00.

**The Touch of Human Hands**

A novel by Joseph R. Linney, Dorrance & Co., Philadelphia. 478 pp., \$3.

This first novel, unusual in theme and treatment, is laid in the stern iron mining country of the Adirondacks, northern New York, where the author has spent 30 years as an executive of one of the major steel companies.

That a tale exhibiting such forward-looking social ideas, such warmth and understanding of the humble folk of the mining villages should have been produced by an industrialist will astound many readers. Yet the book, while in no sense autobiographical, obviously has a broad foundation in actuality. The improvement in the way of life of Adirondack miners is not imaginary, for the mining towns in this region have been transformed, in large measure because of the author's personal influence, into modern, prosperous villages.

The novel is laid in the period following World War I. Jim Lane, young mining engineer, was sent to take charge of an iron mine in a bleak, uninviting Adirondacks community. Through the influence of the company nurse, Betty Dale, he came to realize that his human problems were if anything greater than those concerned with the production of more and better iron ore. Strikes, brawls, the wild and sometimes ferocious conflicts which arose under primitive conditions called for firmness linked with humanity.

The development of the character of Jim is convincingly shown, and in some of the swift action scenes the author creates suspense and exhibits intensity of feeling rare in a first novel. Sally O'Neil, headstrong, vivacious and alluring young school teacher, provides a dramatic threat to the love story of Jim and Betty.

"The Touch of Human Hands" gives evidence of an important new talent from an unexpected source.

## WITH OUR DEALERS

Something New! Fire opal covered with a protecting layer of transparent chalcedony. Found by Ed Rochester, of Winterhaven, Calif.

Gemarts Co., of San Diego, Calif., has a July clearance sale on minerals.

A new advertiser is Launer & Porter, of Pepperwood, Calif., who can furnish interesting loose 12-sided magnetite xls. Get one or two! !

Chrome oxide as a polishing agent for jade and tiger eye is recommended by Universal Minerals, of Los Angeles, Calif. Try it!

Want to enter the mineral business? One is for sale in California. See page 694 for further details.

Roland O. Betterley, of Pottstown, Pa., is with us again. He features a soluble oil for diamond saw cutting.

A new firm is Mineral Enterprises, of Revere, Mass. Note their announcement in this issue.

Another new advertiser is Mineral Book Co., of Colorado Springs, Colo., who feature a new book—"Mineral Collectors Handbook," by Richard M. Pearl. Send your order today for this interesting book!

Hugh A. Ford, of New York City, releases his 14th list of fine minerals from an old collection.

Herbert Sussbach & Co., of New York City, are featuring two collections of cut gem stones.

Another new advertiser is Tex's Gems and Crystals, of Miles, Texas. See their introductory offer.

Jess Abernathy, of Moab, Utah, is with us again. He has some new finds to intrigue you.

A new advertiser is House of Jade, of Santa Barbara, Calif., who can supply gem quality jade from the Arctic Circle.

N. H. Seward, of Melbourne, Australia, has many types of Australian opals in stock such as boulder opals, fire opals, green opals, blue opals, black opals. Also cutting opal in various grades.

After an absence of a few months, Arthur and Lucille Sanger, of Chicago, Ill., are with us again. See their ad!

The Alma Pyrite Mine, of Calif., produces some interesting minerals and a number of these minerals can be supplied by Burminco, of Monrovia, Calif.

Some faceting specials are featured by Glandale Gem & Lapidary Supply Co., of Glandale, Calif.

Want to get some New Mexico agates? James T. Lawyer, of Deming, N. Mex., has some nice ones in stock.

Still another new advertiser is the Aristolite Company, of Santa Barbara, Calif., who feature a new gem stone—aristolite.

C. A. Weeks, of Meredith, N. H., has some rare quartz xls. They might be just what you need for your collection.

Have you an amazonite from Pikes Peak, Colo? If not, get one today from Thompson's Studio, Pomona, Calif.

After an absence of a year, Harold Maryott & Co., of Miami, Ariz., are with us again. They feature domestic minerals for dealers.

Another new advertiser is General Science Service, of Minneapolis, Minn., who have a new polarizing microscope.

A. L. Jarvis, of Watsonville, Calif., has in stock some nice gem material slabs.

Mrs. B. F. Nonneman, of Salinas, Calif., has added a number of new items to her large stock.

Interesting copper nuggets and halfbreeds are available at the Keweenaw Agate Shop, Ahmeek, Mich.

Summer specials are featured by Western Mineral Exchange, of Seattle, Wash.

A new advertiser is Washington State Chamber of Mines, of Seattle, Wash., who extend greetings to all mineralogists and also extend a most cordial invitation to those visiting Seattle to call on them, inspect their mineral exhibits, and to obtain free information on localities, minerals, etc.

King Jade, for sale by King Gems, Inc., of Colorado Springs, Colo., seems to meet with great favor, judging from many comments.

J. J. Jewelfcraft, of Pasadena, Calif., has some nice opal from the famous opal mines at White Cliffs, N. S. W., Australia.

A summer special on Texas agates is a feature of the El Paso Rock and Lapidary Supply, of El Paso, Texas.

Does your collection boast any cat-eyes? Omaha Scientific Supply Co., of Omaha, Nebr., can supply some from the Pacific.

Hatfield Goudey, of Yerington, Nev., is with us again. He can supply mineral specimens and micro mounts.

C. L. Young, of Martinez, Calif., also has a summer special.

Another new advertiser is J. J. Kuchar, of Montvale, N. J., who has some bargains in Brazilian agate.

Still another new advertiser is Joseph Zollman, of New York City, who can supply a number of gem minerals, including rough agate.

Have you a Magni-Focuser? Ted Schoen, of Mt. Vernon, N. Y., can furnish one.

Karl Hudson, owner of Hermosa Gem & Mineral Shop, of Durango, Colo., has a fine stock of Rocky Mts. minerals.

Two interesting fluorescent minerals are featured by MaryAnn Kasey, of Prescott, Ariz.

Have you sent in your subscription for the *Lapidary Journal* of Hollywood, Calif.? Do it NOW!

Garden State Minerals, of Hoboken, N. J., will demonstrate lapidary equipment in action. Get in touch with them for an appointment!

California kunzite, Arkansas rock crystals, and other collectors items are featured by Ward's, of Rochester, N. Y.

Frank Duncan and Daughter, of Terlingua, Texas, have a gem agate special for July and August.

Simplify your display problem is a suggestion of Fred Roberts, Jr., of Monterey Park, Calif.

R. H. Hartson, of Winston, N. Mex., has some nice New Mexico vein agate.

### New Jersey Mineralogical Society

The last meeting of the season was held on June 12, 1947, at the Paterson Museum, Paterson, N. J. The speaker was Curt Segeler, President of the Queens Mineral Society, who addressed the group on the elements of crystallography.

Plans for the summer outing were given out at this meeting—the outing will be held in Connecticut on June 28 and 29, 1947.

### Mapping Work Funds Sought

Action to secure funds for continued mapping work under a joint program of the U. S. Geological Survey and State Division of Mines was launched June 16, 1947, by the San Francisco Chamber of Commerce.

The Chamber action was taken on recommendation of its Mining Committee after the Federal Government had announced cuts in the budget of the U. S. Geological Survey.

During the past several years, a topographical and geological mapping program has been underway, supported by matching funds provided by the State of California and the Federal Government through the U. S. Geological Survey. The Chamber has supported the program since its inception and cooperated in the development of maps.

The Chamber's Mining Committee, headed by Chairman Bert C. Austin, expressed the opinion that funds for this work may no longer be available as a result of these budget cuts.

Emphasizing the importance of the mapping program, Austin said, "Funds for this program have been provided by the State and it is highly essential that the Federal share of the funds should continue to be made available."

### FOUR CORNERS COUNTRY

(Continued from page 627)

country we hope to give you more detailed descriptions of many of its interesting sections soon.

If you feel that the constant grind of business is wearing off the sharp edges of interest in life, get out into this country. See all of it you can but don't hurry. It will be worth your time.

Just a word about preparation. Many good books and articles have been written about this area, its minerals, geology and other interesting features. Your library will have many of them. Get them and read and study them. They will add immensely to your understanding. Do not make the mistake of many who stumble over portions of the area for a lifetime without knowing what they have seen.

## PHANTOM QUARTZ AT EAST HIGHGATE, VT.

BY FRED J. TUPPER  
East Highgate, Vt.

While digging in a crevice on the hogback just northeast of the railroad station, our youngster Jeannette, age 6, discovered a small pocket of interesting quartz crystals apparently weathered out of the sandstone. Upon learning from Mr. Zodac, (Editor of *Rocks and Minerals*) that they contained phantoms, no time was lost in organizing our family of collectors and betaking ourselves to the location, with little Jodie, age 3, as rear guard.

Whereupon we noted the east wall of the seam was solid milky quartz, and the west wall was sandstone having a lining of milky quartz on the inner side. After the topsoil was removed we found a crevice 8" wide filled with fine gray gravel containing loose crystals which was removed with small chisels and bleeding fingers. The crevice, unfortunately, was V-shaped and the vertex was reached too soon at 14", but our mineral bag was filled. After the loot was scrubbed and counted, we displayed 50 good crystals and 6 groups. About a third of the crystals

contained phantoms of milk white nature and were very conspicuous in the clear crystals—probably formed by passing clay coating the terminations at that period of growth. The sizes ranged from tiny to 2" x 1". The best were 1" x 1/2", and the most interesting was doubly terminated 2 1/4" x 3/8" having a phantom in one end.

The site was not thoroughly worked due to lack of time and the adequate tools.

Associated with the crystallized groups were white platy albite crystals. These crystals were of such unusual form that they were not recognized as albite and so a sample was submitted to Dr. F. H. Pough, of the American Museum of Natural History for his examination. Replied Dr. Pough: "The white crystals are albite—note twinning. This could be an interesting locality and worth developing. Such albites are very unusual."

Editor's Note: East Highgate is in the northern part of Franklin County of northwestern Vermont.

## NEW MINERALS RECENTLY DISCOVERED

### Falkensteinite

A new zeolite has been found in basaltic lava near Falkenstein, Oslo area, southeastern Norway. The mineral occurs intergrown with chlorite, or it is fibrous, thread-like with quadratic cross section and prismatic cleavage. It has been described by Tom F. W. Barth and named by him after the locality but further study is needed, including chemical, x-ray, and dehydration studies, before this mineral can be classified.

(*American Mineralogist*, May-June, 1947, p.371)

### Fersmite

A new calcium niobate has been found in the pegmatites of the Vishnevye Mts., of Central Urals, Western Siberia. Its color is black (powder grayish-brown), with a resinous luster. No cleavage. H 4 1/2.

The new mineral was found in two

syenitic pegmatites in the northern part of the Vishnevye Mts., in region of Lake Buldym. Associated minerals include biotite, pyroxhlore, hornblende, apatite, sphene, and quartz; accessories include pyrite, magnetite, muscovite, zircon, and xenotime.

Its name is for A. E. Fersman, a noted Russian mineralogist. The name is not to be confused with fersmannite, a fluoritane-silicate of sodium and calcium, that was named for Dr. A. Fersmann, another noted Russian mineralogist.

(*American Mineralogist*, May-June, 1947, p.373)

### Rooseveltite

A new mineral has recently been found in Bolivia and named for a former President of the United States—Franklin Delano Roosevelt.

Rooseveltite is of gray color, adamantine luster, has no cleavage, its fracture

is conchoidal, and it is very brittle. H 4-4½. G.6.96. Composition  $\text{BiAsO}_4$ .

It was found as a crystalline crust on wood tin veinlets in rhyolitic and dacitic lava flows at Santiaguillo, Macha, Potosí, Bolivia.

(*American Mineralogist*, May-June, 1947, p. 372).



## AUSTRALIAN OPALS

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Thousands now available—Blue, Green, Red, in brown rock. 1" Specimens 25c and 50c each.

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## AQUAMARINE SPECIMENS

Two to four-inch chunks at \$1.50 ea.  
NEW MEXICO MOONSTONE—Four pieces of Cabochon rough for \$1.

ALASKAN JADE—Medium green at 75c per large blank.

WYOMING JADE BLANKS—Four different shades for \$1.50.

GEM ROUGH—25c per blank; 50c and \$1. per slab.

INDIA MOSS AGATE

INDIA BLOODSTONE

VARISCITE

CHRYSOCOLLA

AVENTURINE

BRAZILIAN AGATE

FINE TEXAS AGATE

TIGER EYE (red, blue, gold)

## Robert Tesmer

4400 Pearl Road  
Cleveland 9, Ohio

## IMPORTED GEM ROUGH

We are direct importers with representatives in all important gem producing areas. Our inventory includes:

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Amazonite  
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Moonstone  
Lapis Lazuli  
Opal  
Peristerite  
Sapphire  
Sodalite

Tiger Eye  
Crystal Quartz  
Rose Quartz  
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Tourmaline  
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Send for free price list of more than thirty varieties of gem rough for facet and cabochon cutters. Professional grades guaranteed.

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## NEW CALIFORNIA FIND LEMURIAN AGATE

We sincerely believe this to be the most beautiful agate yet found. Unusual colors and designs. Must be seen and worked to be appreciated. Since we are interested in quantity orders, we are offering the following prices, which are more than fair, and may be changed later.

Up to 100 lbs. ....	\$1.00 lb.
100 to 500 lbs. ....	75c lb.
Over 500 lbs. ....	Prices on request
Slices .....	25 sq. in.

If you are an established dealer, a test sample will be sent upon request. On all orders, satisfaction unconditionally guaranteed.

## PYRAMID ROCK MART

3340 NO. EASTERN AVE.

LOS ANGELES 32, CALIF.

### TO OUR READERS:

## "THE MYSTIC AGNI MANI"

By Baron Richard J. de Touché-Skadding, will be published as a novel on January 1st, 1948.

The recorded facts, and text of his lecture at the American Museum of Natural History on February 19th, 1947 (which we reproduce on page 603 of this number) are translated into real life, such as it is in the steaming jungles of Java, Malaya, and India. Events and adventures connected with the actual discovery of this jewel and the remarkable experiences of present day owners of the Agni Mani are woven by the author into a tale of redblooded adventure of which he himself is part.

A number of coincidences, seemingly in support of ancient beliefs, which defy a scientific explanation, intrigue the reader, as they have baffled the scientists of three continents.

An advance subscription of \$5.00—will secure your autographed copy of this special edition.

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